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Environmental Assessment

Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments

Grand Valley Ranger District,
Grand Mesa and Uncompahgre National Forests
Mesa and Delta Counties, Colorado

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SUMMARY

The Grand Valley Ranger District is proposing sanitation and salvage treatments of spruce beetle (*Dendroctonus rufipennis*) affected Engelmann spruce (*Picea engelmanii*) / subalpine fir (*Abies lasiocarpa*) stands and trembling aspen (*Populus tremuloides*) stands with sudden aspen decline (SAD) (**Appendix A, Maps 1, 2 and 3**). The area where treatment would take place covers parts of Mesa and Delta Counties. All proposed treatments would be within the Grand Valley Ranger District.

Currently, spruce beetle infestations on the Grand Mesa can be best described as well established. Spruce beetle populations have expanded exponentially since 2009. Management efforts would be conducted in the hope that, together with favorable climatic conditions, spruce beetle numbers will decline in certain areas of the Grand Mesa. However, considering the number of spruce beetle affected stands in inventoried roadless areas which occupy a considerable portion of the landscape, the outcome of the spruce beetle infestation on the Grand Mesa is uncertain. Considerable losses of Engelmann spruce could occur on the Grand Mesa with or without the management actions proposed here.

The proposed action is also intended to regenerate sudden aspen decline (SAD) affected stands on the Grand Mesa and the northern Uncompahgre Plateau before significant root death occurs. It is estimated presently that 12,600 acres or approximately 8% of the aspen on the Grand Valley District is affected by SAD. Treatment of SAD affected aspen stands would focus on regenerating stands before significant root death occurs. Research has demonstrated that cutting SAD affected aspen stands can regenerate these stands in many cases.

Proper design of the project, with the inclusion of key design features , would minimize effects to soil and water resources and wildlife habitat.

In addition to the proposed action (Alternative 1), the Forest Service also evaluated the following alternatives:

- Alternative 2, a “no action” alternative, to provide a baseline for comparison.
- Alternative 3, treatments limited to 120 acres in SAD affected aspen stands and 400 acres of spruce beetle affected stands per year. Treatments may include both commercial and non-commercial methods.

Based on the effects of the alternatives, the responsible official will decide whether or not to harvest timber, utilize non-commercial treatments, construct temporary roads or re-open closed roads, as needed, to access treatment areas.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving the objectives of the purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative actions for achieving the stated purpose. These alternatives were developed based on key issues raised internally, by the public and other agencies. This section also includes design features which would be considered in all action alternatives. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by key issues. Within each section, the affected environment is described first, followed by the effects of the alternatives. In addition proposed mitigation measures may be proposed in this section.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Grand Valley Ranger District Office in Grand Junction, Colorado. Please contact Kevin Kyle at (970) 263-5829 if you would like to review the project planning record.

Purpose and Need for Action

The Grand Valley Ranger District is proposing to implement sanitation and salvage treatments on the Grand Mesa and the Uncompahgre National Forests as a result of the spruce beetle outbreak and sudden aspen decline (SAD). This analysis is in response to:

- Substantial increases in areas affected by the spruce beetle;
- Heightened risk of substantial wide spread losses of standing mature Engelmann spruce;
- Need to quickly react to large areas (> ¼ acre) of wind-thrown trees; and
- Sudden Aspen Decline (SAD) affecting extensive areas of aspen.

The main objective of these treatments is to salvage and sanitize spruce stands, where appropriate and feasible, and to regenerate aspen within sudden aspen decline affected stands. The purpose of and need for this action is to:

- Complete salvage and sanitation operations in spruce beetle affected stands that have been attacked (or killed) by insects and remove wind-thrown spruce trees which contribute to rapid increases in spruce beetle populations.
- Regenerate deteriorating aspen stands where feasible and appropriate.
- Improve vigor of existing stands.
- Contribute to utilization of wood/biomass product needs of local facilities to meet local and economic sustainability objectives in the Forest Plan. (Page III-3, GMUG Forest Plan, 1991 and 2008, as amended).

This proposed action is consistent with and tiers to the Forest Plan (2008, as amended). Refer to Maps 1, 2, and 3 (Appendix A) for those areas currently identified to have spruce beetle or sudden aspen decline affected stands. This proposed action responds to the goals and objectives described in the Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forests Amended Land and Resource Management Plan (Forest Plan) and moves the project area towards desired conditions (Forest Plan pages III-1 through III-5). Specifically, the Forest Plan goal for vegetation is to "manage vegetation in a manner to provide and maintain a healthy and vigorous ecosystem resistant to insects, diseases and other natural and human causes.

Spruce Beetle Outbreak Background

Currently, spruce beetle infestations on the Grand Mesa can be best described as well established and approaching an epidemic stage. Recent aerial surveys show that beetle populations are impacting many areas of the Grand Mesa; however the surveys do not show the full extent of the outbreak (**Appendix A, Maps 1 and 2**). The Engelmann spruce / subalpine fir forest type on the Grand Valley Ranger District (GVRD) is extensive, covering approximately 86,000 acres most of which is located on the Grand Mesa.

The GVRD has been implementing sanitation and salvage treatments on the Grand Mesa for the past 12 years. These treatments, in response to spruce beetle outbreaks, have been conducted in an attempt to keep beetle activity at endemic levels and slow the spread into adjacent stands.

Sudden Aspen Decline (SAD) Background

The health condition of numerous aspen stands is degrading due to Sudden Aspen Decline (www.fs.fed.us/r2/fhm/). SAD is attributed, in part, to the following group of biotic agents: Cytospora stem canker (*Valsa sordida*), aspen bark beetles (*Trypophloeus populi* and *Procryphalus mucronatus*), poplar borer (*Saperda calcarata*), and bronze poplar borer (*Agrilus liragus*), all of which typically affect stressed trees. SAD seems to primarily affect mature aspen located at lower elevations on southern or western aspects Research indicates that SAD was initiated in part due to severe drought in 2002.

Recent aerial surveys have shown approximately 8% of aspen stands on the district being affected by SAD (**Appendix A, Maps 1, 2 and 3**). Aerial surveys are very useful in identifying general areas affected by SAD; however ground surveys are often needed in potential treatment areas to determine the actual extent of declining stands and severity of decline.

In conjunction with commercial and non-commercial removal methods, woody biomass markets may be pursued as an option thereby allowing treatments in areas which were once considered not feasible.

Proposed Action

The Grand Valley Ranger District is proposing commercial and non-commercial treatments of spruce beetle-infested and sudden aspen decline affected stands using timber sale contracts, stewardship contracts, permits, and other methods (i.e., prescribed burning, hydro-axing, in-house crews etc.).

A majority of the acreage treated in spruce beetle affected areas would involve sanitation and salvage operations. Due to the anticipated mortality levels, the Forest Service is proposing an extensive approach, including increased removal of dead, dying and diseased trees. From past experience (Lands End operations), and due to the sheer expanse of affected areas, the proposed action will clearly focus on areas heavily impacted by spruce beetles which are reasonably accessible, for best results.

As part of spruce beetle management, individual contracts and permits would be limited to areas which are actively infested with spruce beetles, or where beetle populations have killed standing trees. The treatments may include but may not be limited to commercial timber harvesting and non-commercial operations, such as mastication operations, *trap trees*, hand felling and other management techniques.

Management to regenerate aspen would also include individual contracts and permits limited to areas which are impacted by SAD. The treatments may include commercial timber harvesting and non-commercial operations, such as prescribed fire, mastication operations, hand felling and other management techniques.

It is important to note that this analysis approach is considered "adaptive" management where district timber staff, using various forms of data, can identify and treat active infestations quickly. This would be based on data collected yearly from aerial and ground surveys and other information sources, and would be used to annually prioritize areas for treatment. Priority would be given to freshly attacked areas and areas of recent blow-down, and the goal would be removal of those materials before the emergence of beetles. Emergence typically takes place 2 years after attack.

It is not possible to plot all individual future operations on project maps due to the fluid nature of the outbreak (discussed more in the Silviculture Report, Grand Valley Spruce Beetle Sudden Aspen Decline EA Project Record, Grand Valley District Ranger Office). All future treatment locations would be carefully reviewed prior to implementation (see below).

The treatment areas would **not** be located within the proposed Research Natural Area (*Colorado Natural Areas Program - Potential Research Areas 1996*); other areas administratively withdrawn from harvest activity; or roadless areas (**see Appendix A, Maps 1-3**). Roadless areas are defined as areas designated in the 2001 Roadless Area Conservation Rule and Draft Colorado Roadless Rule 2011 (CRAS). Once the Colorado roadless rulemaking process is finalized, future projects will be consistent with the provisions of the final rule.

Specialist review of individual projects

With this adaptive approach to focusing on active beetle infestations and SAD on the Grand Valley District it is important to have regular and structured input from the interdisciplinary team (IDT) (page 74). Specialists from the IDT including the wildlife biologist, soil scientist, hydrologist, silviculturist, fuels specialist, recreation specialist, roads staff, range conservationist, archaeologist and sale preparation foresters would review individual treatment projects prior to implementation in order to recommend additional Best Management Practices (BMPs), and to provide feedback appropriate to individual treatment areas if necessary.

The intent is to review specific treatment site resource information for all planned projects prior to marking of trees and layout of temporary roads and skid trails to ensure compliance with the environmental assessment. In some cases, it may be determined that additional environmental analysis may be required.

In an effort to disclose annual treatments being considered, the Forest Service will notify interested individuals and groups with information on locations of upcoming treatment locations.

The Grand Valley District Ranger would be the Responsible Official and would approve additional BMP's for individual projects before implementation and these would be kept on file (Grand Valley RD Office). However, based on the proposed design features, minimal additional BMP's are anticipated.

Treatment methods

Spruce beetle management

Within spruce/fir stands affected by the spruce beetle, sanitation and salvage harvest methods would remove dead and dying trees. In addition, the proposed action would allow the Forest Service to react quickly to newly infested areas and wind-throw in hopes of reducing the spread into nearby stands and recreational areas. Although the proposed action is not guaranteed to be wholly effective, it does increase the odds of maintaining spruce dominated stands on the Grand Mesa in certain areas.

Removal methods would be based on the best treatment method to address the spruce beetle within a specific area. Spruce beetle typically attacks older trees which are less able to effectively defend themselves as a younger more vigorous tree. In many cases the older trees are the larger trees in the stand. Two or more age classes are typically encountered in these stands. As a result, after ITS operations much of the advanced regeneration, small and medium sized trees (0-14" in diameter) would remain along with a varying amount of larger trees. This type of harvesting would likely occur on 70% of areas treated.

Where infestations are even heavier, group selection harvesting may be employed. Group selection openings would not exceed 2 acres in size, however along the length of the opening; the width would generally not exceed two tree lengths (based on the tallest trees in the vicinity). Within group selection harvesting areas, most trees would be harvested due to the heavy nature of attacks, to encourage natural regeneration creating new age cohorts. Some trees less than eight inches may be left if viable and would not curtail desirable regeneration. Scarification or exposing areas of mineral soil over approximately 40% of the group area would occur to promote natural regeneration. Also, some slash and debris would be left over approximately 60% of the group to provide "dead shade" to promote natural regeneration of tree seedlings. It has

been well demonstrated that this combination of scarification and slash left in place does effectively promote regeneration.

Where infestations are lighter and where the residual stand would remain wind firm after attacked trees are removed, individual tree selection would be implemented.

Temporary roads that would not exceed a mile per timber sale may be authorized. Some closed roads may be reopened temporarily. Temporary roads would not be built in any inventoried roadless area. New temporary roads and reopened roads would be closed and/or obliterated after use by the purchaser. Closure and travel management methods may include gates, closure orders, water bars, out sloping, removing culverts, ripping, seeding, placing rock or woody debris in roadways, or restoring to contour.

SAD management

Treatments within aspen would occur only in stands affected by SAD. Clearcuts in aspen stands are necessary for regeneration. Stands would be clearcut to allow maximum levels of sunlight on the forest floor, in order to achieve optimal regeneration response. Stands with moderate to high severity SAD would be the highest priority to treat in most cases. Treatment units would not exceed 40 acres in size.

Analytical Assumptions for the Proposed Action

Although originally planned without specified project area acreage limits, it was determined that for a meaningful analysis by the IDT some assumptions had to be made. It was determined by the IDT that a realistic upper annual treatment limit of approximately 800 acres of spruce beetle affected spruce / fir timber and 240 acres of SAD affected aspen timber may be achievable, only if there were considerable increases in funding and personnel positions over current levels. The effects analysis for the various disciplines is based on these parameters for the Proposed Action.

Decision Framework

The environmental analysis documented in this EA is tiered to the Forest Plan. It does not reanalyze the management area allocations already specified in the Forest Plan nor does it seek to re-examine federal regulations or Forest Service policy regarding timber harvest on National Forest System lands.

The Grand Valley District Ranger will be the Responsible Official. The decision will be stated in a Decision Notice. Given the purpose and need, the Responsible Official will review the proposed action, other alternatives, design criteria, and any additional mitigation measures to make the following decisions:

- Whether or not to conduct sanitation and salvage operations in spruce fir; to clearcut aspen stands and conduct temporary road construction.
- If an action alternative is selected, under what conditions timber harvest and associated activities would be conducted.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions from April 1, 2010 through the present. The proposal was provided to the public and other agencies for comment from October

23, 2010 through November 22, 2010. The agency published a Legal Notice of the Proposed Action, Opportunity to Comment in the Grand Junction Daily Sentinel on October 23, 2010.

In addition, as part of the public involvement process, the proposed action was presented during a public field tour on the Grand Mesa on November 4, 2010.

A summary of public comments and responses to these comments are in Appendix C. All public comment letters are located in the project record.

Using the comments from the public and other agencies, (see Issues section), the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated the issues into two groups: key and non-key issues. Key issues were defined as those directly or indirectly caused by implementing the proposed action. Non-key issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not key or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-key issues and reasons regarding their categorization as non-key may be found in the project record.

The Forest Service identified two key issues raised about the proposed action during internal and external scoping:

Issue 1. Threatened & Endangered Species / Sensitive Species

Sanitation and salvage activities, clear cutting of aspen and road development may affect certain federally listed or Forest Service Sensitive species on the Grand Mesa, such as Canada lynx (federally threatened) and purple martin (FS sensitive species).

The Endangered Species Act (ESA) and Forest Service policy require the assessment of potential effects of proposed agency actions on species that are listed as threatened or endangered under the ESA, or as Sensitive by the Regional Forester (FSM 2670). The species that are present or that have potentially suitable habitats in and adjacent to the analysis area will be analyzed in-depth in Chapter 3 of the revised EA, in a Biological Assessment (BA) prepared to meet the requirements of section 7 of the ESA for federally-listed species, and a Biological Evaluation (BE) to meet Forest Service policy for Sensitive species.

Issue 2. Project Scope and Scale

The potential number of acres treated per year and site locations are not specified in the proposed action. Without an acreage limit it is challenging to adequately quantify effects on resources such as wildlife habitat, and soil / water resources.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for Grand Valley District Spruce Beetle and Sudden Aspen Decline Treatments EA. It includes a description and maps (**Appendices A and B**) of each alternative considered. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives

Alternative 1 - Proposed Action

The proposed action is described in pages 3 through 4.

Alternative 2 - No Action

NEPA requires the consideration of a "no action" alternative (40 CFR 1502.14d) where none of the proposed activities identified in the proposed action would occur. This alternative provides a baseline for comparison to aid in determining the relevance of issues and effects of the proposed projects. Under the No Action alternative, current management plans would continue to guide management of the project area. No timber harvest, road construction or road reconstruction would occur.

Alternative 3

This alternative was created by the interdisciplinary team (IDT) to address the issues of threatened and endangered species / sensitive species and project scope and scale (Issues 1 and 2, page 7, based on the proposed action). The responsible official decided to fully analyze this alternative as described below. Under this alternative, the area of spruce beetle affected stands treated would be limited to approximately 400 acres per year and the area of sudden aspen decline affected stands treated would be limited to approximately 120 acres. These acreages could include any combination of commercial and non-commercial treatment methods.

These limits were chosen based on what the IDT felt was reasonable to accomplish in a given year with current staffing and resource levels based on district experience in preparing and offering timber sales and executing non-commercial vegetation treatments.

This alternative would be identical to the proposed action other than the restrictions on acreage treated per year. Under this alternative, as with the proposed action, the interdisciplinary team would evaluate individual proposed treatment sites before the sale or treatment is laid out and implemented so that any specific measures can be prescribed if needed. This alternative would also include a map which would show some of the early projects that are being considered by the district timber staff (**Appendix B, Maps 1, 2 and 3**). Project locations would represent annual priorities made available from ground surveys on infestation level and extent.

Alternative three would not likely affect the size of individual treatment areas or methods used. The implementation of this alternative would make the practice of "prioritizing" crucial in treating affected stands (**Table 1**).

Design Criteria Common to All Alternatives

This section describes project design criteria that are common to all action alternatives. The analysis of effects in the Affected Environment/Environmental Consequences section of this document assumes that these common design criteria are a part of the alternatives. Design criteria come from a variety of sources, including Forest Service Handbooks, the Amended Forest Plan, timber sale contract provisions, etc. Some design criteria are developed by resource specialists to address specific issues related to the proposed activities on the Grand Valley District.

Table 1. Priority treatment guidelines for spruce beetle affected areas*.

Rank	Condition
1	Recent blow down areas (> ½ acres)
2	New outbreak within ½ miles of developed[1] areas (> 5 acres).
3	New outbreak within ½ miles of developed[1] areas (< 5 acres).
4	New outbreak in dense mature to over-mature spruce dominated forest > 5 acres.
5	New outbreak in dense mature to over-mature spruce dominated forest < 5 acres.
6	Ongoing active outbreak areas > 5 acres.
7	Ongoing active outbreak areas < 5 acres.
8	Salvage of older outbreaks with endemic activity > 5 acres.
9	Salvage of older outbreaks with endemic activity < 5 acres.

1 Denotes campgrounds, trailheads, scenic vistas, Nordic ski areas, adjacent to forest roads.

* All priority treatments will only occur outside inventoried roadless areas.

Air Quality

- Any potential burning would be conducted in a manner that complies with State of Colorado air quality guidelines.

Cultural Resources

- Cultural resource surveys will occur prior to project implementation (see programmatic agreement, Grand Valley Spruce Beetle and SAD EA Project Record, Grand Valley Ranger District office). Locations of all known cultural resource sites needing protection would be

shown on internal working maps not subject to disclosure and/or identified on the ground so that these areas are avoided and protected during all phases of project implementation.

- If any new cultural resource sites are discovered during implementation, project activities would stop and the archeologist would be contacted immediately. The archeologist would evaluate the site and determine how the site would be protected.
- Activities involving hazardous tree removal, grapple piling, mechanical treatment, skid trails and landing areas: For all cultural resource sites located during the field inventory or previously known, no mechanical treatment will occur within the site boundary plus a 50 foot buffer around the site. If treatment is necessary, these sites and the 50 foot buffer will be hand treated to remove hazard trees and accumulated fuel build up, per Stipulation 5.B.b. ii and Stipulation 6.a and6 .b, Standard Treatments for Historic Properties, in the 2010 Programmatic Agreement for Bark Beetle, Hazardous Fuel and Tree Reduction Programs (Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments EA project record, Grand Valley Ranger District office).
- Activities involving temporary road construction and skid trails: For all cultural resource sites located during the field inventory or previously known, a 50 foot buffer around the site will be established. The road control line will be moved to avoid the site and the 50 foot buffer area. If the construction cannot physically be relocated and there is the potential for unidentified buried cultural remains, the construction activities in the area will be monitored by an archaeologist.

Fuels

- Logging slash would be lopped and scattered to a depth of no more than 2 feet in most areas. Some areas may have wildlife piles taller than 2 feet, if KV funding is available.
- Sites used as log deck landings may accumulate a larger amount of fuel than the surrounding sale areas. This material is normally piled and burned or chipped as necessary (See silviculture design criteria).
- The area may be opened as a fuel wood gathering site once the logging activity is completed. This activity would target wood debris in the 3" to 9" fuel category which contributes a high percentage of the overall fuel load within this post harvest fuel type (FM 11).
- Temporary skid trails and haul roads would aid in breaking up the horizontal continuity of the fuel bed. If necessary, the road corridor could be treated by removing slash and brush thereby creating buffer strips throughout the sale area.

Noxious Weeds

- Prior to entering the National Forest, all off-road logging equipment, machinery and vehicles would be cleaned to remove any plant material that that may have become attached to the vehicles. These vehicles would be inspected by a Forest Service administrator prior to entering the sale area.
- All seed and materials used for re-vegetation and reclamation (straw, mulches, matting, etc.) would be approved by the Forest Service and certified weed-free only.
- Use only clean fill material from a weed free source.

Other Facilities and Special Uses

- Timber harvesting activities would be conducted in such a manner as to protect fences, ditches, structures, and other facilities within the analysis area.

- In order to minimize the potential for trespass onto private property or damage to facilities associated with the private land, the Forest Service would contact and coordinate with the landowners in order to identify the locations of any improvements associated with the private property. Access to private property should not be restricted as a result of timber activities.
- The Forest Service would also ensure that property boundary lines are located and/or marked. Additionally, the requirement to use BMPs during timber sale activities should help prevent discharge into water sources.
- In order to identify the locations of specific use facilities and concerns the permittees themselves might have concerning the harvesting activities, the Forest Service would coordinate with those permittees early in the process once a specific timber sale area is identified.

Range

- All existing structural range improvements would be protected during timber sale activities.
- Structural range improvements would be immediately repaired by the timber sale operator, to Forest Service standards, if damage occurs due to timber sale activity. Damage to cattleguards on access roads outside the sale area boundary would be included when it is determined to have been caused by timber sale activities.
- During the grazing season (varies from 5/15 – 11/15, depending on allotment and location), gates in existing fences between pastures or allotments would be kept closed during timber sale activities. If new gates are required in existing fences as a result of timber sale activities, the timber sale operator would install a temporary gate or cattleguard at the appropriate location.
- The Timber Sale Administrator would provide periodic updates to the Grand Valley District Rangeland Management Staff during the grazing season on all timber sale operation activities that could affect management of the grazing allotment.
- Temporary fencing would be implemented as necessary to protect aspen regeneration from grazing.

Recreation

- Temporary roads, which overlay designated cross-country ski trails, OHV / ATV trails, bike trail, or hiking trails, would not be obliterated across the entire width of the road. The width of the temporary road would be obliterated to the width of the trail prior to logging operations. The trail corridor would be free of slash and debris. Temporary roads, which use an existing obliterated road, would be obliterated to the condition prior to logging operations.
- During snowplowing operations, the timber purchaser would leave no less than four inches of snow on the roads and would provide a smooth travel surface. Roads would be plowed wide enough so that snowmobiles and log trucks can pass or turnouts would be plowed open. When snowplowing creates berms along designated snowmobile trails or at the junctions of designated snowmobile trails, the purchaser would remove the berms so that snowmobile riders can safely enter and exit trails.
- Winter operations would not occur in designated ski areas from November 15th - May 15th

Silviculture

- Concentrations of advanced regeneration would be protected from excessive logging and felling damage.
- Within group selection harvest units, slash would be scattered or piled so that at least 60 percent of the ground surface is covered by slash to promote establishment of natural regeneration.

- Slash in group selection units should be no deeper than approximately two feet.
- No more than 25% of the group selection unit covered with slash should be characterized as a "continuous" mat of fine slashed materials (foliage, small diameter branches) where germination and seedling establishment would be compromised.
- Groups would be no larger than 2 acres and designed in such a way to reduce the potential for windthrow.
- Scarification should occur on approximately 40% of the ground within a harvested group to promote regeneration. This would generally occur as an outcome of harvesting equipment operating in the group selection openings.
- Skid trails shall not be located within group selection openings.
- Skid trail spacing shall be no less than 75 feet apart, except where they converge at landings.

Snag Habitat and Down Woody Debris

- Maintain 90 to 225 snags per 100 acres, 10 inches in diameter at breast height (dbh) or greater (where biologically feasible). Snags would be maintained away from structures, roads and trails so that they do not create safety hazards to the public.
- Prior to beginning project activities, survey for and mark as wildlife-leave trees those snags containing nest cavities and other signs of wildlife use. Maintain 10 to 20 tons of logs and other downed woody material per acre, where it exists, for species dependant on this material.

Soil and Water

- The guidelines described in the Rocky Mountain Region Forest Service Handbook 2509.25 "Watershed Conservation Practices Handbook" ((WCPH), or other superseding direction) would be the basis for design of watershed protection measures (BMP's).
- During preparation of individual contracts or sales; stream courses, wetlands, and riparian areas would be identified and designated for protection on area maps; and if needed, appropriate water influence zone (WIZ) boundaries and prescriptions developed to protect or enhance stream health, riparian, or wetland conditions.
- Ground disturbance would be minimized to the extent possible within the water influence zone (WIZ). At least one end of the log would be suspended during skidding and skid trails would not be located within 50 feet of any stream or wetland.
- Temporary road alignments would be reviewed and appropriate BMP's identified prior to construction or reconstruction.
- Structures required for temporary road crossings of channels shall be designed to prevent the restriction of expected flows, would be removed prior to snowmelt high flows, and permanently removed during obliteration.
- Temporary roads and log landings would be de-compacted and seeded at the close of operations to facilitate infiltration.
- During the preparation of individual sales, wetlands, riparian areas, and poorly or very poorly drained soils found in valley floor or topographic depressions (soil type 127) would be identified and appropriate water influence zone (WIZ) boundaries and prescriptions developed to protect the wetland and riparian related resources.
- Operation of heavy equipment associated with timber harvest activities and mechanical fuels treatments would avoid wet soil types and wetlands.
- All perennial and intermittent streams, lakes, reservoirs, designated wetlands, and wet soil types would be shown on the sale area map. Designated main skid trails would be required

in units that are associated for each tractor harvest unit to minimize the area subject to soil disturbance. The area detrimentally impacted by tractor yarding would be limited to less than 15 percent of each cutting unit.

- A special management zone extending up to a total of 300 feet may be established around functioning fens. The extent of this zone would be determined and documented during road location and unit layout. Within this zone, specific prescribed actions or design criteria would be applied appropriate to that specific site.
- With the special management zone, roads that are upslope or up-gradient from wetlands classified as fens would be designed so that surface and subsurface water flow would not be interrupted or diverted away from the fen. On slopes less than 10% the potential for flow disruption is low. Roads would be designed without ditches or excavation into the hillslope to prevent the capture and diversion of either surface runoff or groundwater. Where seeps and springs are encountered, roads would be designed to pass water beneath the prism at points where it emerges from the hill slope. Special measures to retain sediment would be required below the road, e.g., straw bales, compacted slash mats or excelsior logs.

Slash Treatment Operations

- Opportunities for biomass harvesting may result in removal of most logging debris, however the Forest Plan minimum of 10 tons of residual biomass would be required to maintain soil productivity.

Spruce Beetle Prevention and Treatment (Control)

- Within all treatment units: In order to prevent population increases in Engelmann spruce beetle, felled spruce shall be removed from the sale area by no later than October 31 of the year following felling.
- All unutilized spruce material, 8 (eight) inches or larger in large end diameter, 8 (eight) feet or more in length, and with 50% (fifty percent) or more tight bark, shall be yarded to landings or other locations agreed to in writing and piled so that it can be burned by Forest Service within one year of the timber being cut. Unutilized spruce material 8 (eight) inches or larger in large end diameter, with 50% (fifty percent) or more tight bark, and less than 8 (eight) feet in length, shall be either (1) piled at landings; (2) bucked to 18 (eighteen) inches or shorter lengths, or (3) have the bark peeled on two sides.
- At the landing, cull spruce logs exceeding 8 (eight) inches large end diameter with 50% (fifty percent) or more tight bark, and part to all of the other slash accumulated at landings, shall be piled. Piled logs exceeding 8 (eight) inches large end diameter shall be bucked into lengths no greater than 5 (five) feet long.
- Units of a sale with high amounts of wind thrown spruce trees would be a priority for removal.
- Designated spruce trees (trap trees) would generally consist of those trees designated to be cut under the silvicultural prescription or cleared for landings, road right-of-ways or skid trails. Trap trees would be removed preferably before October 31 of the following year, but no later than July 31st of the second year.

Travel Management and Roads

- Road maintenance of National Forest System Roads (NFSR) would be maintained by the Purchaser commensurate with use. This would include a deposit for surface rock replacement (gravel) on roads with a gravel surface and deposit for asphalt repair at a minimum if asphalt roads are being used for haul. Existing NFSRs currently open for use would also receive pre-haul maintenance depending upon on their condition and the needs of

the project. Pre-haul maintenance would not include road reconstruction or repairs of an extraordinary nature but would include maintenance of drainage structures, grading the road surface, corrections to cut/fill failures, etc.

- All temporary road locations would be designed to minimize erosion by avoiding excessive grades (more than 12 percent) for long stretches (more than 200 feet).
- Temporary roads would be closed to public use by a closure order and signs during the life of the timber sale. Gates or barricades would be used at junctions of these roads with roads open to public use.
- Timber sale purchasers would be required to develop and implement a specific Traffic Control Plan prior to commencing timber sale operations. The Traffic Control Plan would be approved by the timber sale administrator. (standard timber sale contract provision)
- Timber sale purchasers would be required to furnish, install and maintain all temporary traffic controls that provide Forest users with adequate warning of hazardous or potentially hazardous conditions associated with timber sale activities. (standard timber sale contract provision)
- During periods of log haul, flaggers may be required as necessary at any intersections where log trucks are entering high traffic roads.
- During periods of log haul, it may be necessary for some forest roads to become one-way. Signs would be required to prevent traffic from going against the temporary one-way traffic flow.

Wildlife / Fisheries

- Advanced regeneration would be maintained, as much as possible, in all treatment units, to provide foraging habitat for lynx.
- On-going surveys for amphibians and raptors (particularly northern goshawk and boreal owl) would be conducted prior to treatment operations, to determine locations of individuals or populations of these species and allow for the implementation of mitigation measures as appropriate.
- Created openings in group selection harvest units would be less than 2 tree lengths in width to provide special habitat requirements for some species.
- No activities shall be allowed within ¼ mile of an active northern goshawk nest from March 1 to July 31 if they would cause nesting failure or abandonment (Forest Plan standard and guideline) For the purposes of this project, the boreal owl shall also have a ¼-mile buffer placed around all active nests until the young have fledged or until the Wildlife Biologist determines that the activities would not disturb the nest and nesting pair.
- Wet areas (seeps, ponds, and springs) within harvest units would be avoided by leaving small islands of leave trees to prevent disturbance of these areas.
- Adjacent to fish-bearing streams or fish-bearing lakes: no commercial removal of standing trees would be permitted within 50 feet of reservoirs, natural lakes, perennial and intermittent streams in order to provide future recruitment of course woody debris; maintain stream or lakeside shading; and minimize wind throw potential.

Monitoring

Implementation of the Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments would be completed and monitored by qualified Forest Service personnel such as silviculturists, timber

sale administrators, engineering representatives, pre-sale foresters, timber sale preparation crews, hydrologists, soil scientists, and wildlife biologists. Implementation would be documented in such reports as stand prescriptions, marking guides, marking checks, cruise designs, appraisal and contract reports, timber sale administration inspection reports, wildlife survey reports, site-visit reports, and project design checklists. The District Ranger would review and approve project development after completion of each major step of implementation (i.e. complete certification reports for timber sale gates 1 to 4).

Specific project implementation monitoring includes:

- The timber sale administrator would monitor timber sale contracts and enforce contract provisions to protect resources in the sale area from adverse impacts, according to Forest Service policy.
- The timber sale administrator would locate and monitor temporary road locations, road drainage, and containment of sediment. Inspections would be ongoing during road construction; and road maintenance and erosion control monitoring would continue throughout the life of timber sale contract, according to Forest Service policy.
- The rangeland management specialist would monitor disturbed areas, such as roads, landings, and skid trails for at least two years for noxious weeds, after the disturbance occurred, which would include one inspection per year near the end of the growing season.
- Regeneration success would be monitored in treatment units. First, third, and fifth year regeneration surveys would be conducted by the timber staff, as required by Forest Service policy. If it is concluded that additional cultural treatments are required, these treatments would be scheduled by the silviculturist.
- The hydrologist will monitor fens and wetlands, if applicable to a specific treatment area. Inspections would occur yearly during operations, and yearly (for two years) after operations are completed.

Sale Area Improvement

The Knutson-Vandenberg Act (P.L. 71-319) provides for the use of excess timber sale receipts (KV funds) to conduct sale area improvement work, including wildlife habitat enhancement. Utilizing this potential funding source, the following activities are proposed:

- Under Alternatives 1 and 3, regeneration surveys, appropriate planting of nursery stock in harvest units, or site preparation would be funded by KV collections. If additional cultural treatments (electric fencing, big-game repellent, etc) were determined to be necessary, KV funds could also be used to complete these activities.
- Timber sale areas would be surveyed for two years for noxious weeds. Chemical, biological, cultural, and mechanical techniques would be used, as appropriate, to control populations of noxious weeds during this time period.
- Manipulations and placement of logging slash using seasonal or contractors may be done to enhance wildlife habitat.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information presented below describes various activities and the associated levels of effects or outputs among alternatives (**Table 2**).

Table 2. Comparison of alternatives, treatments on an annual basis.

	Alternative 1	Alternative 2 "No Action"	Alternative 3
Spruce beetle affected areas treated (acres) total.	Up to 800[4]	0	Up to 400
Sudden aspen decline affected areas treated (acres) total.	Up to 240[4]	0	Up to 120
Group selection harvest prescription - spruce (acres).	Up to 240[4]	0	Up to 120
ITS harvest prescription - spruce (acres).	Up to 560[4]	0	Up to 280
Clear cut harvest prescription –aspen (acres).	Up to 240[4]	0	Up to 120
CCF[1] of spruce harvested.	Up to 6400[4]	0	Up to 3200
CCF[2] of aspen harvested.	Up to 5200[4]	0	Up to 2600
Temporary Road Construction[3].	0-4 miles[4]	0	0-2 miles

1 Denotes ccf/per acre estimate based on recent spruce / fir sanitation and salvage operations on the district.

2 Denotes ccf per acre estimate based on recent aspen sales on the district

3 Based on district experience (average of a approximately 2/3 mile of temporary road per sale)

4 Maximum with modest increases in funding and personnel and consideration of accessibility concerns.

Source: Historical data from recent ITS and group selection timber sales in sanitation and salvage operations in spruce dominated stands, and data from recent aspen clear felling treatments on the Grand Valley District.

ENVIRONMENTAL EFFECTS

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for the comparison of alternatives. Further analysis and conclusions about the potential effects are available in

resource specialist reports and other supporting documentation located in the project record (Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments EA Project Record, Grand Valley RD Office).

Environmental Effects of the Key Issues

This section analyzes the effects from the key issues as is shown in **Table 3.** The Biological Evaluation (BE) and the Biological Assessment (BA) (Issue 1) for the Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments EA is hereby incorporated by reference and is located in the Grand Valley RD office.

Table 3: Comparison of effects to key issues, by alternative

Issue	Alternative 1	Alternative 2	Alternative 3
MIS/TES Wildlife Species			
Canada lynx (T & E)	May affect, not likely to adversely affect.	No effect	May affect, not likely to adversely affect.
Greenback cutthroat trout (T & E)	No Effect.	No effect	No Effect
Sensitive Fish Species Determinations	May impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide for Colorado River cutthroat trout. No impact for Bluehead sucker, Flannel mouth sucker and Roundtail chub.	No impact for: Bluehead sucker, Colorado River cutthroat trout, Flannel mouth sucker and Roundtail chub. .	May impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide for: Colorado River cutthroat trout. No impact for Bluehead sucker,Flannel mouth sucker and Roundtail chub.
Sensitive Plant Species Determinations	No impact for Rocky Mountain thistle, lesser panicled sedge, Harrington's beardtongue, Debeque phacelia, sun-loving meadowrue, Wetherill milkvetch and lesser bladderwort.	No impact for Rocky Mountain thistle, lesser panicled sedge, Harrington's beardtongue, Debeque phacelia, sun-loving meadowrue, Wetherill milkvetch and lesser bladderwort.	No impact for Rocky Mountain thistle, lesser panicled sedge, Harrington's beardtongue, Debeque phacelia, sun-loving meadowrue, Wetherill milkvetch and lesser bladderwort.
Sensitive Wildlife Species with potential habitat: marten, pygmy shrew,goshawk, flammulated owl, boreal owl,purple martin, three-toed woodpecker, olive-sided flycatcher,boreal toad, n.leopard frog,	May impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide.	No impact	May impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide.

Table 3: Comparison of effects to key issues, by alternative			
Project Scope			
Early potential treatment locations identified	No	N/A	Yes
Potential number of acres treated per year in spruce / fir	Up to 800	0	Up to 400
Potential number of acres treated per year in aspen	Up to 240	0	Up to 120

Source: Biological Evaluation (BE) for Terrestrial Species for the Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments Environmental Assessment, Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments Project Record, GVRD office.

Issue1. Threatened & Endangered Species / Sensitive Species

Canada Lynx

Species Information

The Canada lynx is a rare and elusive forest carnivore that relies on large remote forest tracts. Lynx habitat consists of two different forest types: early seral stage forests that contain relatively high numbers of prey, and late seral stage forests for denning and cover for kittens (Koehler et al. 1994). Denning females typically select dense, mature forest habitats that contain large down woody debris to provide security and thermal cover for kittens (Koehler et al. 1994). Uneven-aged stands, typically spruce/fir, with relatively open canopies and well-developed understories are used by the snowshoe hare, an important prey species for the lynx. Snowshoe hares are common in montane and subalpine coniferous forests between 8,000 and 11,500 feet elevation. Hares rely on foliage, twigs, and grasses during summer months and mostly needles, browse, and bark during winter months. Snowshoe hares are common in early seral stage forests associated with insular patches of shrubby and grassy areas in the summer and late seral stage forests of Douglas-fir, subalpine fir, and spruce during winter months (Fitzgerald et al. 1994). In the analysis area, red squirrels provide an important alternative prey source. Red squirrel densities tend to be highest in mature cone-bearing forest stands with substantial quantities of coarse woody material on the ground, and are active year-round. Conifer seeds and fungi form the basis of the diet of red squirrels. Unripe conifer cones are harvested and stored in large middens for consumption during winter months (Fitzgerald et al. 1994).

Environmental Baseline

The Environmental Baseline for lynx was described in detail in the 2008 SRLA EIS and Biological Assessment. (USDA Forest Service 2008). A brief summary follows.

Boreal forests in Colorado represent the extreme southern edge of the species' range and these forests are separated from other regions of boreal forests in Utah and Wyoming. As a result, the separation of preferred lynx habitat in Colorado from other boreal forest regions might have limited immigration and emigration of lynx to and from Colorado (USFWS 2000). Natural and

human-caused effects, such as wildfire and timber harvesting, may have resulted in further fragmentation of boreal habitats in Colorado and thus potentially affected locally occurring lynx.

In 1999, the CDOW reintroduced lynx into Colorado. CDOW is coordinating lynx monitoring efforts in southwestern and central Colorado. Since their reintroduction, CDOW monitoring has confirmed that lynx have dispersed into the greater Grand Mesa landscape (USDA 2001). According to the Canada Lynx Conservation Assessment and Strategy (CLCAS) (Ruediger 2000), all potential lynx habitat should be considered occupied by lynx. On October 26, 2001, a Forest Service wildlife biologist reported a positive sighting of a lynx adjacent to the analysis area (Holland 2001). The CDOW has recently confirmed that they are continuing to track a lynx in the Grand Mesa area (Shenk 2002). Both snowshoe hare and red squirrel occur in the analysis area. There is no critical habitat designated for lynx in Colorado.

The GMUG and USFWS cooperatively identified and mapped Canada lynx analysis units in 2000, and revised it in 2010. The analysis area occurs in all the Grand Mesa Lynx Analysis Units (LAU) except South Mamm Peak. Lynx habitat types and vegetative features are summarized within each LAU. There is one lynx linkage area in the Analysis Area, the Battlement Mesa linkage. **Table 4** displays the current lynx habitat figures.

Table 4. Summary of lynx habitat within Grand Mesa LAU's.

LAU	LAU acres	Total lynx habitat acres	Unsuitable acres	% Unsuitable
Cottonwood Lakes	35,035	25,057	63	<1%
Green Mtn.	36,567	24,129	17	<1%
Island Lake	25,649	18,459	132	1%
Kannah Creek	24,040	11,948	47	<1%
Mesa Lakes	23,217	17,391	279	2%
South Mamm Peak	21,331	10,733	0	0 %
Flat Tops	43,112	27,778	4	<1%

Source: GMUG and USFWS Canada Lynx analysis units delineated in 2000 and 2010.

The Effects of the Proposed Action

The objectives, standards and guidelines of the GMUG Forest Plan Amendment (USFS 2008) were reviewed. Based on this review, the following measures were identified to be relevant to these projects and are summarized as follows:

VEG S1

The standard: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows:

If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

VEG S2

The standard: Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period. This 15% includes the entire stand within an even-age regeneration area, and only the patch opening areas within group selections. Salvage harvest within stands killed by insect epidemics, wildfire, etc. does not add to the 15%, unless the harvest treatment would cause the lynx habitat to change to an unsuitable condition.

VEG S6

The Standard: Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional conifer forests may occur only:

1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or
2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or
3. For incidental removal during salvage harvest (e.g. removal due to location of skid trails).
4. Where uneven-aged management (single tree and small group selection) practices are employed to maintain and encourage multi-story attributes as part of gap dynamics. Project design must be consistent with VEG O1, O2 and O4, except where impacts to areas of dense horizontal cover are incidental to activities under this exception (e.g., construction of skid trails).

The Analysis Area for this project is the spruce / fir and aspen stands on the Grand Mesa and the aspen stands on the northern portion of the Uncompahgre Plateau, which are not within inventoried roadless areas. Inventoried roadless areas cover approximately 40% of the total acreage of spruce-fir and aspen habitats in the analysis area.

For this analysis, all project design criteria described above were considered as part of the proposed action. The following assumptions apply for this analysis:

- All spruce-fir stands in the affected area provide snowshoe hare habitat, therefore, VEG S6 applies.
- 70% of the areas treated would be treated with the Individual Tree Selection (ITS) prescription.
- The ITS prescription would change the structural stage from 4C (mature trees with a dense canopy), to a 4B (mature trees with a 40-70% canopy closure).
- Incidental removal of snowshoe hare habitat from the sanitation/salvage/ individual tree selection (ITS) prescription is estimated to be 20%, due to the need for more skid trails than in the clearcut or group selection prescriptions.

- .Group selection openings are tracked under VEG S1 and VEG S2 only, based on SRLA Implementation Guide (2009). Incidental damage for group selection is estimated at 20% between openings (skid trails, etc.), because some ITS may occur between the group openings. Incidental damage is tracked under VEG S6.
- All aspen treatments are assumed to be within lynx habitat, even though the condition of the SAD aspen stands generally is at lower elevations and do not have conifer in the understory.

Lynx Habitat Effects

Within the Analysis Area, lynx habitat only occurs on the Grand Mesa portion of the Grand Valley Ranger District.

Some of the effects of this proposed action (**Table 5**) have been discussed in and are covered under the Programmatic Biological Opinion (USFWS 2008), which is hereby incorporated by reference. The effects analysis tiers to the analysis in the SRLA BA and BO. Some of the effects of vegetation management are evaluated in the SRLA BA and BO, but are not quantified, as the SRLA was a programmatic analysis and not all specific effects could be quantified at that level.

Table 5. Summary of Proposed Vegetation Treatments.

Type of treatment	Alternative 1 Estimated Annual acreage treated	Alternative 3 Estimated Annual acreage treated
Spruce beetle acreage treated	**800**	**400**
Group selection	240	120
Individual tree selection	560	280
Sudden aspen decline acreage treated	**240**	**120**
Clearcut harvest	240	120
Temporary Road Construction	Up to 4 miles	Up to 2 miles

Source: Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments EA proposed action and Alternative 3 description.

Alternative 1

Under the Proposed Action, up to 800 acres of spruce-fir per year could be treated with sanitation/salvage techniques. Over the life of the project, that would be 5,600 acres of spruce / fir treated. Of this, it is estimated that 1680 acres would be group selection (patch openings) and 3,920 acres would be individual tree selection. The group selection patches would be changed to a "currently unsuitable lynx habitat" (stand initiation stage) for approximately 20-25 years. The group selection prescription would result in creating small openings within the stand, which would result in loss of horizontal cover short term. This treatment generally results in better regeneration and a more uneven-aged stand overall. Over time, this would result in more patches of dense horizontal cover for enhanced snowshoe hare habitat.

In the case of individual tree selection, horizontal cover would be reduced to some degree. It is assumed that incidental removal (skid trails, etc.) of snowshoe hare habitat is 20% under this prescription. Therefore, up to 784 additional acres of snowshoe hare habitat may be removed under Exception 3 under VEG S6.

For aspen treatments, up to 1680 acres could be clearcut over the life of the project. This would change these acres to a "currently unsuitable lynx habitat" (stand initiation stage) for approximately 5-10 years.

The total acres affected by Alternative 1 over the estimated life of the project would be up to 1680 acres of aspen and up to 5600 acres of spruce-fir habitat, for a total of 7,280 acres of lynx habitat affected.

Temporary roads up to a mile per timber sale would be allowed. It is estimated that this would result in up to 4 miles per year of temporary road, based on historic small sales having an average of 2/3 mile of temporary road. All temporary roads and reopened roads would be decommissioned after completion of the timber sale.

Alternative 3

If Alternative 3 is implemented, up to 120 acres per year of aspen would be changed from mature to early seral aspen habitat in the short term. Over the life of the project this would be up to 840 acres. These 840 acres would be classified as "currently unsuitable condition" (stand initation stage) if located within an LAU.

Up to 2800 acres of spruce-fir habitat would be affected by treatments during the life of the project. For these beetle-infested stands, the harvest prescription would be sanitation / salvage, either by small group selections, or individual tree selection (ITS) in recent beetle-hit areas. In the case of individual tree selection (sanitation/salvage), horizontal cover would be reduced to some degree. This prescription would occur on up to 1960 acres, and it is assumed that incidental removal (skid trails, etc.) of snowshoe hare habitat is 20% under this prescription. Therefore, up to 392 acres of snowshoe hare habitat may be removed under Exception 3 under VEG S6. The group selection prescription would result in creating small openings within the stand, which would result in loss of horizontal cover short term. This treatment generally results in better regeneration and a more uneven-aged stand overall. Over time, this would result in more patches of dense horizontal cover for enhanced snowshoe hare habitat. Over the life of the project, up to 840 acres within the group selection patches would be classified as "currently unsuitable condition" which would be tracked under VEG S1 and S2. It is estimated that those openings would be used by snowshoe hares after approximately 20-25 years, as they would be surrounded by mature stands, with no more than 2 tree lengths width openings. The incidental damage related to skid trails for going between group openings has already been discussed above by the incidental damage estimate for ITS, which was estimated at 70% of the stand.

The total acres affected by Alternative 3 over the life of the project would be up to 840 acres of aspen and up to 2800 acres of spruce-fir habitat, for a total of 3,640 acres of lynx habitat affected.

Temporary roads up to a mile per timber sale would be allowed. It is estimated that this would result in up to 2 miles per year of temporary road, based on historic small sales having an average of 2/3 mile of temporary road. All temporary roads and reopened roads would be decommissioned after completion of the timber sale.

Lynx Effects

Alternatives 1 and 3

The effects of vegetation management are discussed in the SRLA EIS, BA (US Forest Service 2008) and the Programmatic BO (USFWS 2008). The following is a brief summary.

Under the Proposed Action, treatments may modify up to 7,280 acres of lynx habitats.

Under Alternative 3, treatments may modify up to 3640 acres of lynx habitat.

In spruce-fir, lynx habitats may be degraded somewhat by the removal of recently blown-down logs, reduction of horizontal cover and the opening of the canopy. These projects will maintain the overall structural condition of mature forested stands and will not convert any lynx habitats to a "currently unsuitable" condition. Advanced regeneration would be retained and protected from excessive logging and felling damage. The group selection units are small (< 2 acres, < 2 tree lengths in width) and will promote young regeneration surrounded by mature forests, which should improve habitats for the hare, thereby providing additional prey availability for lynx.

Effects to lynx may include visible and audible disturbances associated with human activities. These disturbances may deter lynx from suitable hunting, denning, or resting habitats. Avoidance of treatment areas by lynx will not likely be significant, because of the relatively small size of the treatment areas compared to the large area of adjacent, suitable lynx habitat within each LAU.

The snowshoe hare is an important prey species of the lynx. Implementation of the Proposed Action or alternative 3 will reduce the availability of suitable snowshoe hare habitat in small areas within the analysis area. Implementation of the either action alternative may increase the amount of suitable snowshoe hare habitat long-term (20-25 years), by reducing canopy cover and increasing age class diversity and thus providing conditions favorable for the establishment and growth of young regeneration, forage and cover types beneficial to the hare.

The treatment projects would remove some mature Engelmann spruce trees, and will result in the loss of some recently blown-down trees/logs, potentially reducing the quality of the treatment units for both snowshoe hare and red squirrel. Although there may be some loss of snowshoe hare and red squirrel habitat quality on the treated areas of spruce-fir stands populations of this species are not expected to be substantially affected because of the extent of unaffected habitats in the analysis area and because the treated areas will continue to provide some level of habitat for the prey species. The treatments *may* reduce the risk or spatial extent of a catastrophic spruce beetle infestation, which, if it happens, could have a great deal of adverse impacts to snowshoe hare and red squirrel habitats, and therefore, lynx.

Removing large live trees reduces the basal area of a stand, which may reduce the forage availability for red squirrel, but does not eliminate it. While this removal may result in decreased conifer seed crops for the red squirrel, the improved health of the remaining stand may result in increased cone production on the remaining trees. Coarse woody debris will generally be retained, except where it is disturbed by skid trails or slash treatment. Although there may be some reduction in the conifer seed crop and disturbance of existing down woody debris in the treatment units, populations of this species will not be substantially affected because of the extent of optimum red squirrel habitats in the analysis area. In addition, the treated areas will continue to provide a substantial conifer seed crop and coarse woody debris in similar amount to the existing situation.

The proposed action would have some negative effects on lynx denning habitat. Lynx denning structure has been increased due to recent blowdown events. These areas currently contain high levels of large woody downed material and serve as excellent denning habitat. In those areas that

occur within the treatment units, merchantable material would be harvested as part of this proposed action. In the majority of the analysis area, this increase in downed woody debris is in pockets with intact forested canopies. Much of it is within Inventoried Roadless Areas, which will not be treated with this proposal. Future denning habitat is expected to increase over the next several decades across the project area and throughout this portion of the Grand Mesa due to increased beetle activity leading to increased spruce kill, resulting in increased dead and downed woody structure.

Temporary roads used to access treatment units would be closed to public use during the sale, and decommissioned when the project is done. Slash and/or other barriers would be placed across the open corridor to reduce use by recreationists. The corridor would not be allowed to be groomed for snowmobile use, and would not be designated as a snowmobile route. Therefore, there would be no net increase in groomed or designated snow compaction routes. Therefore, the proposed action would not likely lead to an increase in competition for prey by other animals such as the coyote or bobcat.

Summary of Effects to Lynx

VEG S1 and VEG S2: As all of the Grand Mesa LAU's are currently at 0-2% stand initiation stage (currently unsuitable lynx habitat), the proposed action or alternative 3 would not result in exceeding either of these Forest Plan standards. The proposed action would convert up to 1680 or 840 acres (respectively) of spruce-fir lynx habitat to a stand initiation stage for approximately 25 years. It would convert approximately 1680 or 840 acres (respectively) of aspen stands to a stand initiation stage for approximately 5-10 years.

VEG S6: Exception 3 under VEG S6 allows for incidental damage to snowshoe hare habitat while doing salvage treatments. This analysis estimates up to784 and 392 acres (respectively) of incidental damage over the life of the project, in all the spruce-fir stands treated. These acres will be reported in 2011 to the USFWS as per the Programmatic Biological Opinion on the SRLA (2008).

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, and private actions that are reasonably certain to occur in the analysis area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. No known future State, tribal, local or private actions are planned within the analysis area.

Historical uses and activities occurring within the analysis area are expected to continue at similar levels. Those that may have a cumulative effect on wildlife resources include canopy removal, livestock grazing, the existing road and trail system, recreational uses, and the existing water development infrastructure. They are either widespread and of low intensity or limited in extent and high intensity. All future decisions relating to these types of uses would require new NEPA analysis and USFWS consultation.

Determination

Rationale:

- The Spruce Beetle and SAD aspen treatments are considered new projects in the analysis area. Treatment units are in spruce fir and aspen stands that are within 1 mile of roads.

Treatments are concentrated in an area already receiving a large amount of public use and that is managed for high levels of year-round recreational use.
- The Battlement Mesa linkage area occurs in the northeast side of the Analysis area, and is composed primarily of aspen and oakbrush habitats. Some small aspen treatments may occur in this area within 1 mile of roads.
- Lynx habitat is modified by the treatments in a manner considered to be a temporary change and is consistent with all the standards within the GMUG Forest Plan (2008).
- Denning structural features (habitat) on the Grand Mesa are currently not limiting.
- Temporary roads constructed for the treatments would be closed and obliterated/decommissioned upon completion of the treatment activities.
- There would be no net increase in groomed or designated over-the-snow routes and snowmobile play areas, and therefore no expected increase in competition for prey from other species such as coyote or bobcat.

Implementation of the Proposed Action, as described above, May Affect, but is not likely to adversely affect the Canada lynx or its preferred habitat, due to discountable effects. These projects will comply with objectives, standards and guidelines included in the SRLA. This conclusion is based upon on the small proportion of potential lynx habitat that will be affected, and on the maintenance of lynx and preferred prey habitats within the Analysis Area. Up to3,380 acres of lynx habitat may be converted to a "currently unsuitable lynx habitat" condition temporarily, very short term in the case of aspen regeneration. There may be long term benefits to snowshoe hare habitats (and therefore lynx) within the treatment units, especially the group selection harvest units. The sanitation/salvage harvest of the beetle-infested spruce may help to reduce the risk of a catastrophic spruce beetle epidemic. A spruce beetle epidemic could result in a much more open canopy than lynx and snowshoe hare prefer.

Sensitive Species

The USFS provided a list of Region 2 sensitive species that may occur within the GMUG. From this list, a sub-list of species that may occur on the Grand Mesa was identified by the Grand Valley Ranger District wildlife biologist and the Forest botanist. Sensitive species on this list were then evaluated for their potential to occur in the analysis area. **Table 6** lists each of the species on this sub-list, gives a brief description of their habitats, and makes a determination of their potential to occur within the analysis area.

Based on this evaluation, it was determined that a number of these species are not expected to occur because the analysis area is either outside of their range and/or does not contain any potential habitat for them (**Table 6**). This group of species would not be impacted by the proposed projects and a determination of "No impact" is appropriate. These species have been eliminated from detailed evaluation and are not discussed further in this BE.

The remaining sensitive species may occur in the analysis area based on known occurrences of, and/or the presence of suitable habitats for, these species. Detailed evaluations of the potential impacts of the proposed project on these species are discussed in the following sections.

Table 6. Grand Valley Ranger District Sensitive Species (Potential).

Species Common Name	Species Scientific Name	Status	Habitat Description	Habitat Found/Species Potentially Occurring within Project Area
MAMMALS				
Fringed myotis	*Myotis thysanodes*	Sensitive Species	Inhabits caves, mines, and buildings in low elevation conifer and oakbrush shrublands up to 7,500 feet. Forages over associated riparian habitat.	Habitat - No Species - No
American Marten	*Martes americana*	MIS & Sensitive Species	Inhabits mature spruce/fir and mixed conifer forests.	Habitat - Yes Species - Yes
Pygmy shrew	*Sorex hoyi*	Sensitive Species	Moist boreal environments, forest generalist, all captures of this species in Colorado have occurred above 9,600 feet.	Habitat - Yes Species - Yes
River otter	*Lontra canadensis*	Sensitive Species	Riparian habitats that traverse a variety of other habitats, mainly large river systems.	Habitat – No Species - No
Rocky Mountain bighorn	*Ovis canadensis canadensis*	Sensitive	Rocky, steep, or rugged terrain with open grassy habitats for nearby foraging.	Habitat- Yes Species- No
Desert bighorn	*Ovis canadensis nelsoni*	Sensitive	Deserts, canyons at lower elevations	Habitat-yes Species-no
Spotted bat	*Euderma maculatum*	Sensitive Species	Restricted to cliff or rock faces in arid canyons associated with waterways in ponderosa pine or Douglas fir at 6,000-8,000 feet.	Habitat – No Species - No
Townsend's big-eared bat	*Corynorhinus townsendii*	Sensitive Species	Forages in semi-desert shrublands, pinyon-juniper woodlands and open montane forests. Roosts in caves, mines, buildings and crevices.	Habitat – No Species - No
Wolverine	*Gulo gulo*	Sensitive Species	Inhabits undisturbed high boreal forests and tundra near timberline.	Habitat – Yes Species - No
BIRDS				

Table 6. Grand Valley Ranger District Sensitive Species (Potential).

Species Common Name	Species Scientific Name	Status	Habitat Description	Habitat Found/Species Potentially Occurring within Project Area
American three-toed woodpecker	*Picoides dorsalis*	Sensitive Species	Species is resident in mature and old growth stands of spruce/fir.	Habitat - Yes Species - Yes
American peregrine falcon	*Falco peregrinus anatum*	Sensitive Species	Species nests on high cliffs overlooking rivers/lakes and forages over forests and shrublands.	Habitat - No Species - No
Black swift	*Cypseloides niger*	Sensitive Species	Species nests on high cliffs near or behind large waterfalls and forages high above the landscape over conifer forests.	Habitat - No Species - No
Boreal owl	*Aegolius funereus*	Sensitive Species	Mature spruce/fir or spruce/fir-lodgepole forests.	Habitat - Yes Species - Yes
Brewer's sparrow	*Spizella breweri*	Sensitive Species	Inhabits sagebrush-dominated shrublands; may also be found in alpine willow stands.	Habitat - No Species - No
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	Sensitive Species	Inhabits sagebrush dominated shrublands, intermixed with grasslands and mountain shrublands.	Habitat - No Species - No
Flammulated owl	*Otus flammeolus*	Sensitive Species	Nests in cavities in aspen and aspen mixed with conifer habitat to 10,000 feet, foraging close to nest sites, may forage over shrublands.	Habitat – Yes Species – Yes
Gunnison Sage-grouse	*Centrocercus minimus*	Candidate Species	Late-successional sagebrush	Habitat - No Species - No
Lewis' woodpecker	*Melanerpes lewis*	Sensitive Species	Inhabits lowland and foothill riparian areas and nests in decadent cottonwoods 2,000-8,000 feet.	Habitat - No Species - No
Loggerhead shrike	*Lanius ludovicianus*	Sensitive Species	Species inhabits open country with available lookout perches, especially semi-desert shrublands.	Habitat - No Species - No
Northern goshawk	*Accipiter gentilis*	MIS & Sensitive Species	Mixed hardwoods and conifers in stands of mature timber above 7,500 feet.	Habitat - Yes Species - Yes

Table 6. Grand Valley Ranger District Sensitive Species (Potential).

Species Common Name	Species Scientific Name	Status	Habitat Description	Habitat Found/Species Potentially Occurring within Project Area
Northern harrier	*Circus cyaneus*	Sensitive Species	Nests and forages in dense portions of open montane grasslands and wet meadows.	Habitat - No Species - No
Olive-sided flycatcher	*Contopus cooperi*	Sensitive Species	This species breeds primarily in mature spruce/fir or Douglas fir forests.	Habitat - Yes Species - Yes
Purple martin	*Progne subis*	Sensitive Species	Species forages in open grassy parks, shores of lakes, meadows and around ponds; prefers aspen habitat near open water or wet meadows. Nests in mature aspen stands.	Habitat - Yes Species - Yes
Sage sparrow	*Amphispiza belli*	Sensitive Species	Desert sagebrush habitat	Habitat - No Species - No
AMPHIBIANS				
Boreal toad	*Anaxyrus boreas boreas*	Sensitive Species	Subalpine forest habitats with marshes, wet meadows, streams, beaver ponds, and lakes.	Habitat - Yes Species - Yes
Northern leopard frog	*Lithobates pipiens*	Sensitive Species	Wet meadows, marshes, beaver ponds, and streams.	Habitat - Yes Species - Yes
FISHES				
Bluehead sucker	*Catostomus discobolus*	Sensitive Species	Colorado River Basin Drainage: Variety of habitat, headwater streams to large rivers.	Habitat - No Species - No
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	MIS & Sensitive Species	Headwater streams and lakes.	Habitat -Yes Species -Yes
Flannelmouth sucker	*Catostomus latipinnis*	Sensitive Species	Deep slow flowing pools in large rivers	Habitat - No Species - No
Roundtail chub	*Gila robusta*	Sensitive Species	Colorado River Basin Drainage: Variety of habitat, usually in slow-flowing water adjacent to fast moving water	Habitat - No Species - No
INSECTS				
Great Basin silverspot	*Speyeria nokomis nokomis*	Sensitive Species	Inhabits wetlands fed by springs or seeps; host plant violets at 5,200-9,000 feet.	Habitat – No Species - No

Table 6. Grand Valley Ranger District Sensitive Species (Potential).

Species Common Name	Species Scientific Name	Status	Habitat Description	Habitat Found/Species Potentially Occurring within Project Area
Hudsonian emerald	*Somatochlora hudsonica*	Sensitive Species	Boggy ponds 7,600-10,600 feet.	Habitat - Yes Species - No
PLANTS				
Lesser panicled sedge	*Carex diandra*	Sensitive Species	Fens, calcareous meadows 6,100-8,600 feet.	Habitat - No Species - No
Lesser bladderwort	*Utricularia minor*	Sensitive Species	Aquatic plant found in fens.	Habitat- Yes Species- Yes
Rocky Mountain thistle	*Cirsium perplexans*	Sensitive Species	Found on barren gray shale slopes 4,500-7,000 feet. Rock, cliff, and canyon habitat.	Habitat - No Species - No
Harrington's beardtongue	*Penstemon harringtonii*	Sensitive Species	Found 6,800-9,200 feet in open sagebrush or, less commonly, pinyon-juniper habitat. Not documented in Mesa or Delta County.	Habitat - No Species - No
DeBeque phacelia	*Phacelia scopulina var submutica*	Sensitive Species	Found at low elevation 4,700-6,200 feet, on steep clay slopes in the Wasatch Formation.	Habitat - No Species - No
Sun-loving meadowrue	*Thalictrum heliophilum*	Sensitive Species	Sagebrush and pinyon-juniper habitat in underdeveloped soils, light colored clays with shale fragments; 6,300-8,800 feet	Habitat - No Species - No
Wetherill milkvetch	*Astragalus wetherillii*	Sensitive Species	Big sagebrush and pinyon-juniper habitat. Steep slopes, canyon benches, and talus below cliffs. On sandy clay soils derived from shale and sandstone 5,250-7,400 feet.	Habitat - No Species - No

Source: Grand Valley District Sensitive Species List, Grand Valley Ranger District, Grand Junction, CO..

GENERAL EFFECTS ANALYSIS

The Analysis Area for this project is the spruce- fir and aspen stands on the Grand Mesa and northern portion of the Uncompahgre Plateau, which are not within inventoried roadless areas. Inventoried Roadless areas are approximately 40% of the total acreage of spruce-fir and aspen habitats.

For this analysis, all project design criteria described above were considered as part of the proposed action (Alternative 1) and Alternative 3.

CHANGES IN VEGETATION AND HABITAT EFFECTS

Alternative 1

If the proposed action is implemented, it is expected that up to 240 acres per year of mature aspen habitat would be changed to newly regenerating aspen habitat in the short term. Natural regeneration of these stands would occur over time, but it is likely that it would take decades for the habitat to return to conditions similar to current. The stands are, however, expected to regenerate sufficiently to allow for use as habitat by a variety of species within one to several years. The early and mid- seral stages of aspen are currently under-represented on the Grand Mesa. Succession and change of habitat suitability for various species would take place over many decades.

It is expected that up to 800 acres per year of mature spruce-fir stands would be affected by harvest treatments. For the most part, this would change the structural stage from 4c (mature trees with a dense canopy). To a 4B (mature trees with a 40-70% canopy closure). In some cases, treatments would create small openings within the stand, to regenerate small pockets of young trees.

The approximate total acres affected over the life of the project would be up to 1680 acres of aspen and up to 5600 acres of spruce-fir habitat.

Temporary roads up to a mile per timber sale would be allowed. It is estimated that this would result in up to 4 miles per year of temporary road. All temporary roads and reopened roads would be closed and obliterated to a decommissioning level of at least 5 after completion of the timber sale. See decommissioning level definitions in Appendix A.

Alternative 2

The direct and indirect impacts of the “no action” alternative would not change current habitat or population conditions of any Forest Service sensitive or management indicator species in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within the project area, as indicated in the cumulative effects tables in this analysis. Based on present knowledge of the spruce beetle epidemic and the aspen decline, this may result in both short and long-term loss of spruce and aspen at a large scale in the analysis area.

Approximately 8% of the aspen stands in the Analysis area are impacted by sudden aspen decline. Statewide, surveys have documented the decline on approximately 21% of the aspen in Colorado, as of 2008.

Alternative 3

If Alternative 3 is implemented, up to 120 acres per year of aspen would be changed from mature to early seral aspen habitat in the short term. Up to 400 acres of spruce-fir habitat would be affected by harvest treatments per year.

The harvest prescription would be coppice cut (clear-cutting) with natural regeneration for aspen stands that are impacted by Sudden Aspen Decline (SAD). For spruce-fir stands, the harvest prescription would be sanitation and salvage. For the most part, this would change the structural

stage from 4C (mature trees with a dense canopy), to a 4B (mature trees with a 40-70% canopy closure). In some cases, the sanitation/salvage would result in group selection prescriptions that create small openings within the stand. This generally results in better regeneration and a more uneven-aged stand.

The total acres affected over the life of the project would be up to 840 acres of aspen and up to 2800 acres of spruce-fir habitat.

Temporary roads up to a mile per timber sale would be allowed. All temporary roads and reopened roads would be closed and obliterated after completion of the timber sale, as described in Alternative 1.

Species Information/Effects

American Marten

Existing Environment

American marten are indicators of interior forest integrity in that they reflect the vigor of the microhabitats on which they depend. They are sensitive to the abundance and behavior of human activities, modification of microhabitats, and availability of prey (USFS 2001). Habitat conditions are the primary influence on current local populations of marten. Since legal trapping for marten in many states has been discontinued, research indicates marten population trends are now directly influenced by changes in habitat components (prey abundance, availability of denning sites, cover patterns) at the microhabitat scale and changes in habitat composition and connectivity (mature forest stand fragmentation) at the landscape scale (Campbell et al. 1979).

Mature conifer forests provide specific marten habitat requirements including resting sites, denning sites, subnivean access areas, logs in various stages of decomposition, and trees leaning into other trees. The extent of marten occurrence, on both a local and range-wide scale, is closely correlated with the occurrence of suitable mature coniferous forests that provide these special habitat requirements. Marten also frequent high elevation riparian areas associated with coniferous forests.

The marten's diet varies by season, year, and geographic area. A typical summer diet may consist of bird eggs and nestlings, insects, fish, and small mammals. This strictly carnivorous diet shifts in autumn months to take advantage of berries and other fruits. During winter months, small- and medium-sized mammals, including voles, mice, hares, and squirrels, become important prey items. Martens hunt for small mammals by searching on the ground or snow surface. Down woody debris is an important component of the marten's habitat because small cavities and passages are created when this natural debris is covered with snow and are used as shelter by small mammal prey species. Martens use these subnivean spaces to hunt prey (Ruggiero et al. 1994).

In the central and southern Rocky Mountains, including the GMUG, marten prefer mature to over-mature spruce/fir and lodgepole pine cover types. This cover type provides canopy closure and diversity in forest-floor structure that are preferred by the marten. As summarized by Buskirk et al. (1994), unique microhabitat conditions are selected for resting sites, natal and maternal dens, and access sites to spaces beneath the snow. Resting sites were generally associated with larger tree boles and with logs of intermediate decomposition. In a study by

Wilbert (1992), natal dens were reported to be associated with large tree boles. Coarse woody debris and the lower branches of live trees were reported by Corn and Raphael (1992) to be important for allowing marten to gain access to subnivean spaces.

Microhabitat features that are important to the marten include accumulations of woody structures on or near the forest-floor and leaning trees used as ramps into closed, interconnected tree canopies. Standing, broken-topped, dead trees, hollow stumps, and decomposing logs provide access to subnivean habitats (USFS 2001). Other microhabitat features that function in similar ways are living branches near the ground (Buskirk et al. 1989) and associated aspen and/or riparian vegetation (Spencer and Zielinski 1983).

Within the analysis area, approximately 86,461 acres of mature 4B/C spruce/fir exists, which represents 90% of the spruce/fir cover type present.

Marten have been documented to occur in the analysis area. The estimated home range for a marten is two square miles (1,280 acres) (USFS 2001a).

Alternatives 1 and 3

Direct effects, such as injury or mortality, to the marten from implementation of the Proposed Action or Alternative 3 would not be likely, due to their ability to leave disturbance areas. Some individuals of the various marten prey species may be directly affected if they are unable to leave the treatment areas. Suitable habitats for the marten and its prey species would be disturbed, as described in the habitat effects discussion above. Under the Proposed Action, up to 5600 acres (6.5 percent) of suitable marten habitats in the analysis area could be affected by project activities. Under Alternative 3, up to 2800 acres of suitable marten habitat (3.2%) could be affected.

Indirect impacts to marten would occur during implementation of the project. Increased human activity and associated visual and audible disturbances may temporarily displace individuals from treatment units during treatment activities. Following completion of activities, the type and degree of human disturbance is expected to return to current levels.

Project activities would indirectly affect habitats used by prey species; however, prey species are not thought to be a limiting factor for marten in the analysis area. This effect is not expected to be a substantial impact to the marten because of the assumed relative abundance of prey species in the analysis area and the relative amount of adjacent suitable habitats that would not be affected by the action alternatives.

Mitigation measures have been included as part of the alternatives in order to maximize marten habitat suitability within the treatment areas. These measures are presented in the Design Features section above and include preserving down woody debris, preserving snags, and limiting the size of any created openings.

The grass/forb type occurs as small inclusions in the timber harvest units that would not be affected by timber harvest activities. Individual openings created by removal of groups of trees would not exceed two tree heights (maximum of 2 acre); therefore, the structural class of treated stands would not be altered.

Activities associated with the treatment of slash may result in the modification or disturbance of down woody debris that provides suitable resting, denning, or hunting habitats within the treatment units. Existing down woody material would only be affected along skid trails and other

areas of ground disturbance. Under the sanitation/salvage prescription, primarily recent windthrown and bug-killed trees would be salvaged. Forest Plan standards for down woody debris and snags would still be met by either fir or spruce logs/snags without any remaining bark. Under the group selection prescription, some down woody material within the groups would be removed to facilitate regeneration, but outside the groups, woody debris would be preserved except along skid trails.

The Proposed Action and Alternative 3 include the construction and reconstruction of temporary roads to gain access to, and haul logs from, treatment units. These roads would be limited to 1 mile per sale area. Construction of access roads may affect suitable habitats of the marten and its prey. The relative severity of effects from road construction and reconstruction would be minimal due to the limited area that would be affected and the relatively large area of suitable habitats that would not be affected. Most road construction and reconstruction would occur along edge habitats and existing roadways. These habitats are not preferred marten habitats. The total acreage of these activities would be substantially less than the total acreage of the treatment units and minimal in relation to the amount of adjacent undisturbed habitats.

The implementation of spruce beetle treatments may affect important marten microhabitat features, such as down woody material, but there would continue to be connectivity with other unaffected microhabitat features both within and outside the treatment units. Marten may be displaced from the treatment units both during and after treatment; however, their overall use of the analysis area is expected to remain the same as current levels, due to the extent of suitable marten habitat that would be available in close proximity to the treatment units.

Determination

Implementation of the Proposed Action or Alternative 3 "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the American marten. This determination is based on the potential for impacts to marten or their prey, some degradation of suitable marten and prey habitats, the maintenance of connectivity with undisturbed habitats, and the availability of suitable undisturbed habitats.

Pygmy Shrew

Existing Environment

The pygmy shrew may occur in suitable habitats throughout the mountainous regions of central Colorado. All captures of this species in the state have been at elevations above 9,600 feet. There are no reported occurrences of this species in Mesa or Delta Counties, Colorado (Fitzgerald et al. 1994). This species can occur in a variety of habitats including subalpine forests of spruce/fir and lodgepole pine, clear-cut and selectively logged forests, forest-meadow edges, boggy meadows, willow thickets, aspen/fir forests, and subalpine parklands. As with many shrews, behavior patterns are poorly understood. It builds runways under stumps, fallen logs, and litter. This species is active day or night and eats a variety of animal matter including carrion, invertebrates, and other small mammals.

Suitable habitats for this species occur within the Forest and the analysis area. Within the analysis area, suitable habitat may include 146,000 acres of various vegetation types. Although

unconfirmed, pygmy shrews are expected to occur in these suitable habitats throughout the Forest and analysis area.

Alternatives 1 and 3

The degree of functionality of post-project shrew habitats is difficult to quantify but would depend on existing shrew habitat conditions, intensity and distribution of activities within treatment units, and potential shrew responses to these impacts. The functional loss of shrew habitats within the treatment units would not result in substantial effects to the pygmy shrew because of the generalist habitat requirements of this species, the potential suitability of some habitats within the treatment units following implementation, and the availability of similar shrew habitats outside the treatment units within the analysis area.

Effects Specific to the Project

Implementation of the Proposed Action would affect up to 5600 acres of shrew habitat. Implementation of the project would affect shrew habitats by disturbing existing large down woody debris and other ground surface covering. The primary objective of the spruce beetle treatment project is not related to the removal of down woody debris and any disturbance that may occur to this habitat component would be incidental and highly localized. Most disturbances to down woody debris and other forest-floor materials would be associated with skid trails. Skid trails would not account for more than 15 percent of the area within each treatment unit; therefore, down woody debris in the remaining 85 percent of each treatment unit would not be substantially degraded and would maintain functionality as shrew habitat. The functionality of these habitats would not be lost but may be degraded somewhat. The degree of loss would depend on existing shrew habitat conditions, intensity and type of harvest activity, and potential shrew responses to these impacts. The potential effects to shrew habitats within the timber harvest/treatment units would not be important to locally occurring shrews because habitat functionality would not be completely lost, and because of the availability of large tracts of unaffected habitats adjacent to and connected with the treatment units.

Determination

Implementation of the Proposed Action or Alternative 3 “may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide” for the pygmy shrew. This determination is based on the potential for injury or mortality of individual shrews, disturbance to potentially occupied habitat, maintenance of habitat functionality within project treatment units, and the availability of suitable habitats outside of the treatment units.

Wolverine

Existing Environment

Across their range, wolverines inhabit boreal forests and tundra habitats. In the Rocky Mountains of Idaho, wolverines spend as much as 70 percent of their time within coniferous vegetative cover (Copeland 1996). Specific habitat associations in Colorado are not known but are suspected to be similar to other populations inhabiting mountain habitats in the lower 48 states. In addition to coniferous cover, large resident ungulate populations are also identified as an important wolverine habitat component (Fitzgerald et al. 1994). Wolverine occurrence information in Colorado is mostly limited to records established in the nineteenth century.

Information from these records and the paucity of more recent sightings indicates wolverine populations in the state were never high and that this species, if it still occurs in Colorado, occurs at very low densities.

Suitable coniferous and alpine habitats for the wolverine exist within the Forest and analysis area. Despite recent efforts by CDOW, evidence of only one wolverine has been identified within the state. No evidence of wolverine presence has been documented in the analysis area.

Alternatives 1 and 3

Implementation of the Proposed Project would affect potentially suitable wolverine habitats. The spruce/fir cover type, which is suitable wolverine habitat, accounts for approximately 86,461 acres in the treatment units. The modification of these habitats as the result of the projects would not be important to the wolverine. Sanitation/salvage harvest within the treatment units may alter the current canopy closure within 4B and 4C spruce/fir stands but would not result in a shift of either of these structural classes to below 40 percent canopy closure. . Individual openings created by removal of groups of trees would not exceed two tree heights (maximum of 1/2 acre); therefore, the structural class of treated stands would not be altered. Similar, unaffected spruce/fir habitats would be adjacent to and connected with the treatment units that would maintain important travel corridors between habitats. In addition, wolverines are less dependent on coarse, woody debris than other species, such as marten.

Determination

Implementation of the Proposed Action/Alternative 3 would have "**no impact**" to wolverine based on the extremely low likelihood of occurrence of this species in the analysis area and the lack of important effects to potentially suitable habitat.

American Three-toed Woodpecker

Existing Environment

In Colorado, burned areas and subalpine coniferous forests, particularly spruce/fir habitats, are the preferred habitats of the northern three-toed woodpecker. Burned areas and old-growth forests provide suitable conditions for wood-boring insects, the primary food source for the three-toed woodpecker. In Colorado, three-toed woodpeckers have been observed in suitable habitats between 7,000 to 12,000 feet in elevation. In Colorado, nesting typically occurs from late May to late July (Versaw 1998).

Three-toed woodpecker habitats exist within the Forest and analysis area. Within the analysis area, approximately 86,461 acres of suitable woodpecker habitat exists. Three-toed woodpeckers are especially prevalent in areas impacted by spruce beetle. Three-toed woodpeckers have been documented within the Forest and the analysis area.

Alternatives 1 and 3

Under the Proposed Action/Alternative 3, effects to the three-toed woodpecker, including direct injury or mortality may occur due to the operation of equipment in occupied habitats. Effects to suitable habitats would include the removal or alteration of potentially suitable nest trees and insect host trees. Treatment activities for the projects may reduce the availability of naturally occurring insect host trees and the recruitment of new insect host trees within the up to 5600 (Alt.1) and 2800 (Alt. 3) acres of suitable habitat included in the treatment units,.. Integrated

design features would preserve snags and down woody debris that may be beneficial to wood-boring insects and thus also to the three-toed woodpecker. These measures would maintain suitable habitats for wood-boring insects, yet still achieve objectives specific to the treatment prescriptions.

Determination

Implementation of the Proposed Action "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability range-wide" for the three-toed woodpecker. This determination is based on the potential for direct injury or mortality, maintenance of suitable nesting and insect host trees within the treatment units following the project implementation, and the availability of suitable habitats outside the treatment units.

Boreal Owl

In Colorado, boreal owls occur primarily in mature Engelmann spruce and subalpine fir forests above 9,000 feet in elevation. This owl prefers wet habitats near streams or bogs, because these areas typically support large populations of small mammals, the primary prey item for the boreal owl. Summer adult ranges can vary between 593 and 869 acres, while winter ranges may vary between 1,961 and 3,631 acres (Ryder 1998).

Boreal owl habitats, primarily mature to over-mature spruce/fir, exist within the Forest and analysis area. Approximately 86,460 acres of boreal owl nesting and foraging habitats occur in the analysis area. Boreal owls have been documented to occur and breed within the analysis area. Many instances of documented nesting are based on use of artificial nest boxes. The GMUG has been actively surveying and monitoring the boreal owl on the Grand Mesa over the last ten years. There is an extensive network of boreal owl nest boxes located across the Grand Mesa, including the analysis area.

Alternatives 1 and 3

Under the Proposed Action and Alternative 3, potential disturbance of nest trees may occur due to implementation of the treatment projects. No activities would be allowed within ¼ mile of an occupied boreal owl nest box or known active nest from March 1 to July 31.

Activities associated with the treatments may remove potentially suitable nest trees. Implementation of the Action Alternatives would not remove or alter all potentially suitable nest trees in the treatment units; therefore, some level of nesting habitat would be maintained. Nesting or foraging habitats would be maintained within the treatment units and are also available in untreated timber stands throughout the analysis area. Project activities would indirectly affect habitats used by prey species because the fuels reduction and timber harvest projects would open forest canopies somewhat and remove some of the down woody debris. This potential effect to prey species within the treatment units would not be an adverse impact to boreal owls because of the relative abundance of prey species in the treatment units and the relative amount of adjacent suitable habitats that would not be affected by the Action Alternatives.

Determination

The implementation of the Proposed Action "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the boreal owl. This determination is based on the

presence of occupied nesting and foraging habitats in the analysis area, the availability of suitable habitats not included in the treatment units, and the integrated mitigation measures intended to minimize effects to nesting boreal owls.

FLAMMULATED OWL

The flammulated owl inhabits old growth or mature ponderosa pine forests but would also inhabit ponderosa pine/Douglas fir or other conifer forests mixed with mature aspen. In some areas, birds are seen in pure aspen; some also occur in old-growth pinõn/juniper woodlands. They prefer forests with dense canopy covers close to relatively open areas. They are an uncommon to common summer resident in foothills and lower mountains and appear to be more common than most observers have realized. They appear to be most common in western and southern Colorado. The flammulated owl apparently migrates through the mountains. They are most commonly found between 4,500-7,800 ft. but would range up to 10,000 ft. They nest in old flicker holes or other woodpecker holes with eggs laid from early May to late June. They are found throughout the Grand Mesa National Forest in suitable habitat. There are 153,413 acres of aspen, which are potentially suitable habitat, within the analysis area.

Alternatives 1 and 3

Implementation of the proposed treatment projects may affect the flammulated owl or potentially suitable flammulated owl habitats. This statement is based on the presence of suitable habitats within the treatment units and the loss of potential nesting trees and foraging habitats.

Determination

Implementation of the Proposed Action and Alternative 3 may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the flammulated owl. This determination is based on the direct effects to suitable habitats within the treatment units, mitigated by the fact that there is a large amount suitable habitat outside of the treatment units.

Northern Goshawk

Existing Environment

The northern goshawk is widespread in its distribution. It breeds in coniferous, deciduous, and mixed forests throughout much of North America. In Colorado, the goshawk is considered a rare to uncommon year-round resident of coniferous forests (USFS 2001). Goshawks often re-use the same territory year after year and sometimes use the same nest. Preferred nesting sites and prey base are typically found in mature forests (Barrett 1998a). Post-Fledging Areas surround the nest site and range in size from 300-600 acres (Reynolds 1992). Foraging areas may extend beyond breeding and nesting territories to include as much as 5,000-6000 acres of various cover types (USFS 2005). Typical breeding habitat includes mature forests with high canopy closure, high density of large trees and snags, large downed woody debris, and small (less than two acres) openings in the forest canopy (USFS 2005). Nesting typically begins in March and fledging occurs in early to mid-July. Adults and fledglings may occupy nesting areas until late September (USFS 2005). As a top-level forest predator, the goshawk typically preys upon rabbits, squirrels, chipmunks, grouse, woodpeckers, jays, robins, grosbeaks, and other forest interior birds and mammals.

Northern goshawk habitat occurs throughout the Forest and analysis area, with approximately 123,518 acres occurring in the analysis area. Goshawks have been documented on the Grand Mesa and the Uncompahgre Plateau.

Alternatives 1 and 3

Each of the action alternatives includes a design feature that would require surveys for amphibians and raptors prior to harvest operations. This would allow for "mitigation measures as appropriate." In the case of goshawk, the mitigation would be to institute a 30-acre no-harvest buffer zone centered on all newly discovered goshawk nests and a timing limitation excluding all activities within ¼ mile of an active nest between the period of March 1 and July 31 or until young birds have fledged from the nest. These features would minimize potential effects to active nests and goshawk individuals within the treatment units if an active territory is discovered before harvest.

Under the Proposed Action and Alternative 3, treatment activities would take place in approximately 7,280 and 3,640 acres, respectively, of suitable goshawk habitats. Goshawk foraging within the treatment units may be temporarily affected due to project-related human activities, which may cause goshawks to forage in undisturbed areas. This effect to foraging goshawks is minor and temporary due to the short-term nature of the project activities and the availability of suitable foraging habitats within unaffected portions of the analysis area. Sanitation and salvage harvesting within the treatment units may alter the current canopy closure within 4B and 4C spruce/fir stands but would not result in a shift of either of these structural classes to below 40 percent canopy closure. Group selection is prescribed for some of the acres. Individual openings created by removal of groups of trees would not exceed two tree heights (maximum of 2 acres); therefore, the structural class of treated stands would not be altered. Project implementation in spruce-fir would maintain appropriate habitat characteristics for goshawk foraging and post-fledging areas. Clearcuts in aspen would reduce goshawk habitat in small areas, but the majority of the mature aspen in the analysis area would not be treated. Under Alternative 1, approximately 1680 acres of aspen could be harvested, and under Alternative 3, 840 acres of aspen could be harvested, out of a total of 153,413 acres.

Determination

Implementation of the Proposed Action "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the northern goshawk. This determination is based on the availability of suitable nesting and foraging habitats outside of the treatment units, maintenance of preferred structural stages 4B and 4C in spruce-fir, and the integrated design features and mitigation measures that would prevent impacts to nesting goshawks.

Olive-sided Flycatcher

Existing Environment

The olive-sided flycatcher breeds in boreal forests from Alaska to Newfoundland and in the mountains of the western United States (Jones 1998). In Colorado, the olive-sided flycatcher is a montane summer resident at elevations of 7,000 to 11,000 feet (Andrews and Righter 1992). Olive-sided flycatcher breeding habitat in the western United States is primarily mature spruce/fir, Douglas-fir and, less often, other coniferous forests, and montane and foothill riparian

and aspen forests in the 7,000 to 11,000 feet elevational range (Andrews and Righter 1992). Within these habitats, this species occurs primarily within live, logged, or burned forests with snags, natural clearings, bogs, stream and lakeshores with water-killed trees (Jones 1998). Tall trees, trees with spiked tops, or high conspicuous dead branches and dead snags, as well as adequate live trees for nesting sites, are important components of all nesting habitats.

Suitable habitats for this species occur throughout the Forest and within the analysis area. Approximately 86,461 acres of suitable habitat occur within the analysis area. This species is known to occur within the Forest and the analysis area.

Alternatives 1 and 3

Under the Proposed Action and Alternative 3, injury or mortality to the olive-sided flycatcher may occur due to the operation of equipment in occupied habitats. Effects to suitable habitats would include the removal or alteration of potentially suitable nest trees and insect host trees. Under the Proposed Action and Alternative 3, the treatment projects would disturb up to approximately 5600 acres and 2800 acres, respectively, of suitable habitats within the treatment units. These acres would still provide suitable flycatcher habitat after treatment. Treatment activities would potentially augment existing habitats within the treatment units by creating new or larger forest canopy openings that may be suitable as foraging areas. Implementation of these projects would not result in a shift in any acres to unsuitable habitat for the olive-sided flycatcher.

Determination

Implementation of the Proposed Action "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the olive-sided flycatcher. This determination is based on the potential for direct injury or mortality of individual birds, alteration of existing nesting and foraging habitat, maintenance of suitable nesting and foraging habitats within the treatment units following the project implementation, the availability of suitable habitats outside the treatment units, and the potential improvement of existing flycatcher habitats within the treatment units.

Purple Martin

Existing Environment

In Colorado, the purple martin is a common summer resident in the lower mountains of the west-central portion of the state (Andrews and Richter 1992). Nests of this species occur almost exclusively in mature aspen stands and only occasionally nests in mixed aspen/ponderosa pine or aspen/Douglas-fir forests (Andrews and Righter 1992). Nests are often within 1,000 feet of water, including small creeks and stock ponds.

Suitable nesting habitat for this species occurs in older-growth aspen on the Forest and in the analysis area. Approximately 153,413 acres of aspen cover type exists in the analysis area. This species is known to occur within the Forest and may occur in suitable habitats within the analysis area.

Alternatives 1 and 3

Implementation of the proposed treatment projects would affect the potentially suitable purple martin habitats. Under alternative 1, up to 1680 acres of aspen could be removed and

regenerated, and under Alternative 3, up to 840 acres of aspen could be treated during the life of the project. These acres would be changed to an early seral stage, of aspen saplings which do not provide nesting habitat. Given that there are 153,413 acres of mature aspen in the Analysis Area, there would be a substantial amount of suitable habitat remaining.

Determination

Implementation of the Proposed Action may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" on the purple martin. This determination is based on the direct effects to suitable habitats within the treatment units, mitigated by the availability of suitable habitats outside of the treatment units.

Northern Leopard Frog

Existing Environment

The northern leopard frog occurs throughout Colorado, excluding most of the southeastern and east-central portions of the state. The elevation range of this species is from approximately 3,500 feet to above 11,000 feet. Suitable habitats for this species include wet meadows and the banks and shallows of marshes, ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches. Most often leopard frogs can be seen near the water's edge, but they may roam when wet meadows and marshes are present. Once abundant in suitable habitats in Colorado, this species has recently become scarce. Although causes for the decline of this species in Colorado may be numerous, several important causes include increased predation pressure from bullfrogs, disturbance or destruction of breeding ponds, and natural extirpations which commonly occur in small, localized populations (Hammerson 1999).

Suitable habitats for leopard frog include water bodies, wetlands and streams. No wetlands, streams, or open water occur within the treatment units, but could be affected by road work associated with the vegetation treatments. Although specific surveys for this species have not been conducted, occurrence of this species is expected in suitable habitats within the analysis area.

Alternatives 1 and 3

Injury or mortality to the northern leopard frog would be possible during the implementation of the Proposed Action or Alternative 3 due to project-related increase of vehicle traffic near suitable northern leopard frog habitats. Suitable habitats for the northern leopard frog may be disturbed by roadwork, as discussed below.

Under the Proposed Action or Alternative 3, leopard frog habitats, particularly wetlands and wet meadows near streams, may be disturbed by temporary roadwork activities. Reconstruction of existing roads would result in limited ground disturbance, and may result in improved habitat conditions where the existing poor quality road has degraded riparian habitats.

Determination

Implementation of the Proposed Action "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the northern leopard frog. This determination is based on the potential for injury or mortality to leopard frogs and disturbance of suitable habitats.

Boreal Toad

Existing Environment

In 1995, the USFWS listed the boreal toad (*Anaxyrus boreas boreas*) as a candidate for federal protection under the Endangered Species Act (ESA) (USFWS 1995). On September 29, 2005 the USFWS announced the withdrawal of the Southern Rocky Mountain population of the boreal toad from the list of species being considered for protection under the Endangered Species Act (ESA), which made it no longer a candidate species. However, the boreal toad is also a USFS Region 2 sensitive species and does receive the protection afforded to species with this designation.

The boreal toad is restricted to the southern portions of the Rocky Mountains. It typically occurs in mountain habitats between 8,500 and 11,500 feet in elevation occupying damp conditions near marshes, wet meadows, streams, beaver ponds, and lakes interspersed in subalpine spruce/fir, lodgepole, and aspen forests. In late spring and early summer, toads typically occur in or near aquatic habitats and gradually become more terrestrial as the season progresses.

Once common in the Colorado Rocky Mountains, this species experienced a severe decline in distribution and population numbers that was first reported in the early 1990's. Possible factors associated with the decline include damaging effects from increased ultraviolet light on embryos, acidification and heavy-metal contamination of water, and habitat destruction and degradation. Specifically in Colorado, habitat destruction and degradation may be important factors for recent declines. Many suitable habitats have been lost or damaged following mountain reservoir construction and operation. Algal blooms apparently caused by the release of nutrients from mountain home septic tanks have degraded lakes once occupied by boreal toads (Hammerson 1999). There are only two known populations of boreal toads within the Analysis Area, both of which are on the Grand Mesa.

Alternatives 1 and 3

Suitable habitats for the boreal toad may be impacted by temporary roadwork needed to access treatment units. Direct mortality from heavy equipment could occur within treatment units, but the likelihood of this is remote, as there are only two known populations of toads on the Grand Mesa.

Boreal toad habitats, streams and wetlands, may be affected by temporary roadwork under the Proposed Action and Alternative 3. Reconstruction of existing roads would result in limited ground disturbance, and may result long term in improved habitat conditions where the existing poor quality road has degraded riparian habitats.

Determination

Implementation of the Proposed Action "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability range-wide" for the boreal toad. This determination is based on the low level of anticipated impacts to suitable habitats, and the remote potential for boreal toads to occupy these habitats.

Colorado River Cutthroat Trout

Existing Environment

The Colorado River cutthroat (CRCT) historically occupied portions of the Colorado River watershed in Wyoming, Colorado, Utah, Arizona, and New Mexico. The original distribution of the species included the upper portions of large streams and rivers such as the Green, Yampa, White, Colorado, and San Juan Rivers. Lower portions of these rivers were most likely used during fall and winter due to unsuitably high water temperatures during summer months. Currently, populations are restricted to headwater streams and lakes. Populations typically occupy streams with average daily flows of less than 30 cubic feet per second (cfs), gradients of greater than 4 percent, and at elevations greater than 7,500 feet (Young 2008).

Currently there are 39 conservation populations known to occur on the GMUG (Dare et al. 2011). Conservation populations are those identified using genetic analysis, having less than 10 percent non-native genetic composition (Hirsch et al., 2006). Conservation populations occupy approximately 138 miles of stream on the GMUG, with most populations occurring in the northern end of the Forest, particularly on the Grand Mesa and the North Fork of the Gunnison River valley (Dare et al., 2011). The contributing watersheds of these populations comprise 269 square miles of forestlands. Extant populations occupy 6 percent of historically occupied stream miles on the GMUG. Existing populations are located in isolated headwater streams of 0.5 to 12 miles in length, and remain at risk for localized extirpations.

Suitable habitats for CRCT and other trout species occur in many lakes and streams in the analysis area. Most water bodies on the Forest include populations of non-native salmonids, including brook trout, brown trout, and rainbow trout, which are maintained for recreational purposes by the Colorado Division of Wildlife. These populations are not conservation priorities on the GMUG.

Alternatives 1 and 3

There are 3 known conservation populations in the analysis area: Coon Creek, East Fork Big Creek, and Young's Creek Reservoir #2. All three of these populations are on the Grand Mesa. While no direct effects can be anticipated because activities associated with this project would not occur in lake or stream habitat, indirect effects associated with timber harvest in watersheds surrounding conservation populations could adversely impact cutthroat trout. Post-harvest sediment input to streams could affect the quality and quantity of habitat available to cutthroat trout should timber harvest occur in watersheds supporting conservation populations. Harvest in riparian areas (< 10 m from stream banks) could affect stream temperatures by allowing greater light penetration to the water's surface. Assuming an appropriate suite of BMPs would be used during project implementation, negative impacts to CRCT conservation populations are likely to be minimal or discountable.

Determination

Implementation of the Proposed Action or Alternative 3 "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the CRCT. This determination is based on the potential for impacts to specific habitat patches that support conservation populations on the Grand Mesa, including those in Coon Creek, East Fork Big Creek, and the area surrounding Young's Creek Reservoir #2. If treatments were not to occur in these three watersheds there would likely be no impact to CRCT associated with this project.

HUDSONIAN EMERALD DRAGONFLY

Existing Environment

The Hudsonian emerald dragonfly appears to be an uncommon species in Region 2, as there are only seven locations it has been documented in Colorado, and three locations in Wyoming. It is commonly distributed across Canada and Alaska, however. It has not been documented on the GMUG; however, suitable habitat does occur in the Analysis Area.

The Hudsonian emerald dragonfly inhabits deep lakes and ponds that have sedge vegetation around the edges. Boggy ponds and sedge marshes are potential habitat, as long as the water is comparatively cool, from 16 to 20 degrees Centigrade. Trees near the aquatic habitat may be important for adult Hudsonian dragonflies, for roosting and mating, as well as to provide shade for the pond, to keep the water temperature cool.

Hudsonian emeralds have been documented in seven locations within a 40-mile radius of Boulder, Colorado. Potential habitat exists outside these locations however, and further surveys and investigations are needed to determine distribution.

Alternatives 1 and 3

Degradation of aquatic habitat is the main threat to this species. Trees are an important component of areas surrounding the aquatic habitats of the Hudsonian emerald dragonfly, since they provide areas for foraging by adults as well as shade that maintains lower water temperatures. Trees may also serve as mating areas. The loss of trees would occur through timber harvest and fuel reductions, however, wetlands would be avoided. Sedimentation may also occur as a result of road construction and reconstruction. Design features have been incorporated to use the Watershed Conservation Handbook measures for sediment control.

No project activities would directly impact wetlands or ponds within the Analysis Area. Changes in pond shading due to removal of trees near ponds may result in indirect impacts, due to potential for increases in water temperature.

Determination

Implementation of the Proposed Action or Alternative 3 "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor to cause a trend towards federal listing or a loss of species viability rangewide" for the Hudsonian emerald dragonfly. This determination is based on the anticipated impacts to suitable habitats, and the remote potential for this species to occupy these habitats.

LESSER BLADDERWORT

Existing Environment

This member of the Lentibulariaceae (bladderwort) family is found in high elevation wetlands and fens on the Grand Mesa National Forest. The plant is a perennial forb found in shallow water and wet soil. It has small bladders that are used to trap aquatic invertebrates which are digested for nutritional purposes. The bladderworts are the only predatory aquatic plants in the U.S. The flowers are pale yellow and resemble a snapdragon, with 2-8 flowers on a thread-like stalk rising 1.5" to 6" above the water's surface. The distribution of lesser bladderwort is circumboreal, south in North America to New Jersey, Indiana, North Dakota, California and Colorado. There are several documented occurrences of lesser bladderwort in the Analysis Area.

Alternatives 1 and 3

There would be no direct impacts to this species because there would be no activity in the aquatic habitats in which this species occurs. Within 100 feet of all wetlands (not including wetlands that are impounded waterbodies) and fens, no activities would be permitted except for the use of existing road or trail crossings. In order to avoid indirect impacts to this sensitive species, a special management zone extending up to a total of 300 feet may be established around functioning fens. The extent of this zone would be determined and documented during road location and unit layout. Within this zone the following limitations apply: no removal of standing green timber would be permitted within this zone which reduce canopy cover by more the 30%; skidding or forwarding would only occur over dry or snow or frozen ground conditions; all tops and limbs would be removed with logs; excelsior logs would be used to trap sediment below roads when slopes are steeper than 15%. Within the special management zone, roads that are upslope or upgradient from wetlands classified as fens would be designed so that surface and subsurface water flow would not be interrupted or diverted away from the fen. On slopes less than 10% the potential for flow disruption is low. Roads would be designed without ditches or excavation into the hillslope to prevent the capture and diversion of either surface runoff or groundwater. Where seeps and springs are encountered, roads would be designed to pass water beneath the prism at points where it emerges from the hill slope. Special measures to retain sediment would be required below the road, e.g., straw bales, compacted slash mats or excelsior logs. Any roads crossing down gradient from fens would avoid excavation or ditching that may have the potential to drain the fen.

There are numerous wetlands that occur in the analysis area. These wetlands provide potential habitats for this species. For each of the action alternatives, there would be no treatment units within wetland habitats. There would be no direct effects to these habitats because of these specific activities, with the exception of road reconstruction activities on existing roads. All wetland areas would be avoided through protection and design criteria previously mentioned, and in the Watershed Conservation Practices Handbook (WCPH). Construction of temporary roads would avoid wetland habitats. Any sedimentation effect is expected to be short-term in nature.

Indirect effects may occur to wetland habitats in the general vicinity of treatment units, or roads associated with treatment units. For example, management activities within upland areas may introduce sediment to adjacent or nearby wetland habitats due to surface water runoff from disturbed areas. This type of impact would generally be avoided through application of project design features as discussed above and in the WCPH.

Determination

Implementation of the SB/SAD vegetation treatment projects would have “no impact” on the lesser bladderwort. Habitats for this sensitive species would be avoided and mitigation measures described above are sufficient to protect against any measurable indirect effects to habitats. Similar projects within the analysis area have not affected these habitats.

Issue2. Scope and Scale

Scope and Scale Effects

Alternative 1

The potential number of acres treated per year and site locations were not originally specified in the proposed action for spruce beetle and SAD affected areas, and it is was not possible to represent to the public how many acres would be treated in a given year. The IDT determined that an upper level of treatment amounting to approximately 800 acres of spruce beetle affected spruce / fir timber and 240 acres of SAD affected aspen timber would be achievable if appropriate resources were available. Adopting these "analysis limits" allowed the IDT the ability to frame the effects analysis in a meaningful way regarding potentially affected resources.

Although, each individual project would be reviewed by the IDT team to recommend site specific design criteria, framing the analysis in this way allows both the public and the IDT a better idea on what the potential effects could be from the proposed action, especially on the landscape level. Specific effects to individual resources based Scope and Scale will be discussed in specialist reports, if applicable, as it pertains to Alternative 1.

Alternative 2

There would be no forest land on the Grand Valley District treated under this EA for Alternative 2 so there would be no effects on scope of this project.

Alternative 3

The amount of acreage treated in spruce beetle affected stands and SAD affected stands would be limited to 400 acres and 120 acres, respectively. These levels of treatment were determined by the IDT to be achievable with current levels of funding and staffing and considered reasonable to accomplish in a given year with those resources. This alternative would emphasize the importance of prioritizing treatments (**Table 1**).

This alternative along with the proposed action better enables the individual resource specialist to better quantify the level of effects to other resources such as hydrology, soils, wildlife habitat, and vegetation with a landscape perspective. This approach also provides additional information to the individual IDT member that is useful in recommending design criteria and BMP's for individual projects.

This alternative also presents some of the early treatment priorities based on ground surveys done in 2010 (**Appendix B, Maps 1, 2 and 3**), in order to give the public and members of the IDT an idea where many of the initial priorities lay. These locations are approximate and priorities may change based on the subsequent data collection and need to adapt treatment strategies. Specific effects to individual resources based Scope and Scale will be discussed in specialist reports, if applicable, as it pertains to Alternative 3.

Other Resources

Management Indicator Species

Management Indicator Species (MIS) are those species that have been selected by National Forests within their Forest Plans to represent the habitat needs of a larger group of species requiring similar habitats. Descriptions of the habitat relationships, distributions and trends, population trends and status, and summaries of their associated Forest Plan Directions, Standards and Guidelines for the GMUG Forest MIS, are described in the Management Indicator Species Assessment for the Grand Mesa, Uncompahgre and Gunnison National Forests (2005) as well as

the 2005 amended Forest Plan. These documents are available from the GMUG National Forest's website at http://www.fs.fed.us/r2/gmug/policy/.

The MIS listed in the 2005 MIS Forest Plan Amendment, are summarized in **Table7** below, along with the determination of either their known presence or the presence of suitable habitat within the project area. Suitable habitat is based on field surveys, a review of the literature, and forest mapping of the vegetation.

Table 7. MIS, their habitat associations, and the potential for their occurrence in the SB/SAD Analysis Areas.

Common Name	Scientific Name	Habitat Associations	Habitat or species Present Within the Project Analysis Area?
Rocky Mountain elk	*Cervus elaphus*	Early succession spruce-fir, Douglas-fir, lodgepole, aspen, mountain shrub. Also MIS for travel mgmt.	Yes
Abert's squirrel	*Sciurus aberti*	Mature to late seral ponderosa pine	No*
American marten	*Martes americana*	Late-succession spruce-fir, lodgepole pine	Yes
Merriam's Wild Turkey	*Meleagris gallopavo*	Oak and Pinyon-Juniper Aspen, mixed conifer	Yes
Red-naped Sapsucker	*Sphyrapicus nuchalis*	Aspen/Cavity Nester	Yes
Northern goshawk	*Accipiter gentilis*	Late-succession aspen, aspen/conifer mix	Yes
Brewer's Sparrow	*Spizella breweri*	Mature sagebrush	No*
Colorado River cutthroat trout (CRCT)	*Oncorhynchus clarki pleuriticus*	Aquatic and riparian habitats	Yes
Rainbow trout	*Oncorhynchus mykiss*	Aquatic and riparian habitats	Yes
Brown trout	*Oncorhynchus trutta*	Aquatic and riparian habitats	Yes
Brook trout	*Salvelinus fontinalis*	Aquatic and riparian habitats	Yes

Source: Grand Valley District Management Indicator List (MIS), Grand Valley Ranger District, Grand Junction, CO..

The primary habitat associated with this species is not known to occur in the analysis area, and the species is either not known to occur there or its occurrence in the analysis area is incidental and not representative for its associated habitat. They will not be directly, indirectly, or cumulatively impacted by proposed activities and no further analysis is necessary.

Species Excluded From Further Analysis

All species in **Table 7** above that were not known to be present within the analysis areas or did not have associated habitat types within the analysis areas were excluded from further asssessment. The species excluded from further analysis and the rationale for their exclusion were as follows.

- Abert's squirrel – This species utilizes late-successional ponderosa pine stands. It is present on other localities within the GMUG but neither the habitat nor the species is present within the analysis areas.
- Brewer's sparrow – This species is associated with mature, late-successional stands of sagebrush which are not present in the treatment area, and no sagebrush would be affected within the Analysis Area or the Cumulative Effects Area. Brewer's sparrow does not occur in the Analysis Area or the Cumulative Effects Area.

Species and Habitat Types Selected For Further Analysis

Only the spruce-fir and aspen habitat type will be altered by the proposed project. However, all MIS species with documented presence and/or known primary habitat within the SB/SAD analysis areas that could potentially be affected by changes or activities within the Analysis Area will be addressed, and they are:

Generalist species:

- Rocky Mountain Elk
- Merriam's wild turkey

Spruce-fir associated species:

- American Marten
- Northern goshawk

Aspen and aspen/conifer mix associated species:

- Red-naped sapsucker
- Northern goshawk

Aquatic species:

- Common Trout (cutthroat, rainbow, brook and brown)

The complete MIS Assessment can be found in the project file. For all analyzed MIS species the project may temporarily displace individuals because of the construction of temporary roads, and the traffic and activities associated with project activities. The alteration of habitat and temporal disturbance should not result in a defined change in population numbers or trends at project or Forest scales. The project is consistent with the direction of the Forest Plan relating to MIS.

Silviculture

Spruce Beetle Effects

Alternative 1

Direct effects of implementing the proposed action could potentially contribute to a reduction in spruce beetle life forms in certain areas. By removing forest products which contain eggs, larvae and young adults which have not emerged will hopefully contribute to a reduction in the spread of the spruce beetle into nearby unaffected areas.

Management efforts are being instigated in the hope that with favorable weather conditions (cool moist summers and cooler than average winters), spruce beetle numbers will decline on the Grand Mesa, in certain areas. Spruce beetle is always present in spruce dominated stands but generally require a disturbance event such as a blow down to reach epidemic proportions. Forest stands on the Grand Valley District have become very dense and old over the past century. Somewhat static conditions have prevailed however with events of recent years such as numerous blow downs beetle populations are now actively infesting many areas of the Grand Mesa.

The effectiveness of these treatments will hinge on the ability to act quickly where new infestations are detected.

Individual tree selection or (commercial) harvest of affected trees will lower stand stocking levels promoting improved tree vigor in the residual stand. This would increase the odds that such treated stands would be able to withstand future attacks.

Some harvesting methods used in the past have dropped stocking levels to a point where stands are more susceptible to wind throw. Large buildups of beetle populations can usually be traced to blow down events. Guidelines to use group selection units in areas of heavy infestation would reduce wind throw and thus lower the risk of resulting buildups.

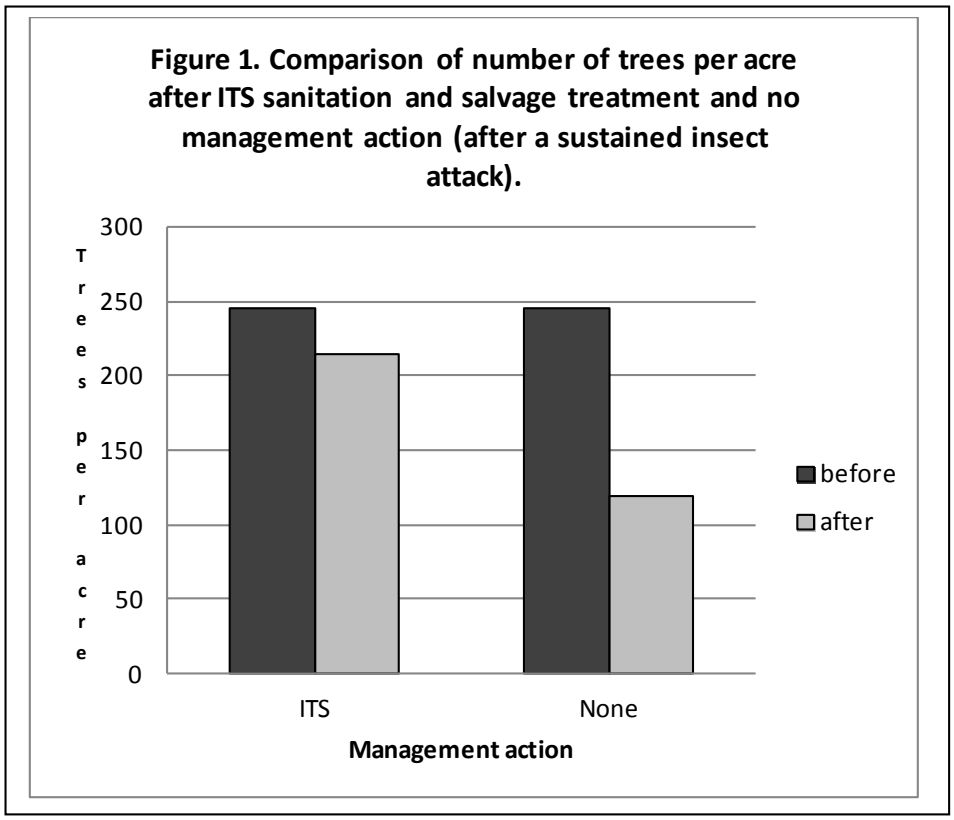
There are many areas of the district which are inaccessible for sanitation and salvage treatments such as inventoried road-less areas (approximately 47 % of the district) and lands unsuited for treatment (rocky terrain, steep slopes), which makes management even more challenging because they are a potential source of attacking adult beetles. Proposed actions are no guarantee that there will not be substantial losses of mature spruce on the Grand Mesa in the near-term future. However, proposed management activities increase the likelihood for maintaining mature spruce in at least some portions of the Grand Mesa, a prospect that will result in greater age class diversity.

Alternative 2

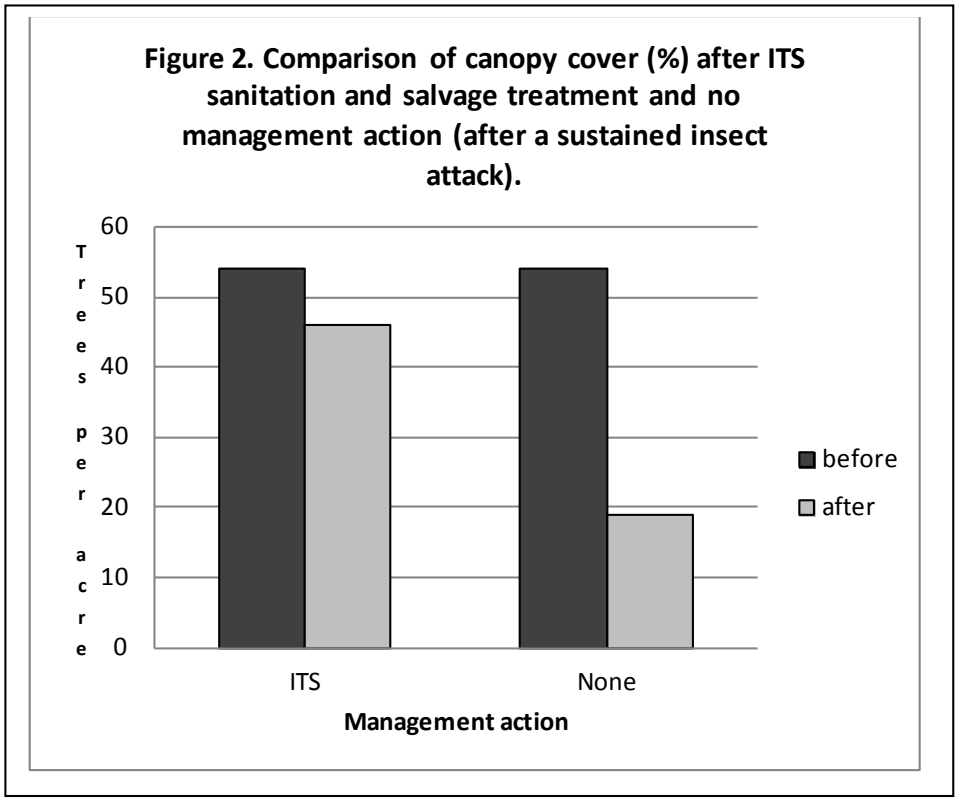
Direct effects of Alternative 2, where No Action is taken may contribute to large scale increases in spruce beetle populations on the Grand Mesa as have been observed on the Rio Grande National Forest to the south of the GMUG. It is clear that an epidemic of spruce beetle activity may result in a scenario where virtually all spruce trees are attacked (even younger, more vigorous spruce trees are killed in an attack) resulting in mortality over large sections of the landscape. This could drastically alter the character of spruce / fir forests, including lowering the number trees per acre by approximately 52% (**Figure 1**), and lowering canopy cover by approximately 65% (**Figure 2**). These figures were based on modeling assumptions where

approximately 95% of spruce trees 8 inches and larger were attacked by the beetle, with 82 % and 18% of the original stand stocking being spruce and fir, respectively. It is possible that some climatic agent such as a very cold winter, or a biologic agent may slow or stop the outbreak in absence of treatments, but that is difficult to reliably predict. In many cases after such a rapid buildup as is being observed on the Grand Mesa, the only thing that will stop the beetle is a lack of food (spruce trees).

This would eventually result in massive efforts to reforest the Grand Mesa over time, again producing a large "pulse" of trees being established at the same time which may predispose these future stands to catastrophic insect infestations a hundred or more years in the future. It is likely that this scenario is largely responsible for the primarily single age class nature of spruce stands currently found on the Grand Mesa.



Source: Modeled data from typical spruce / fir stands on the Grand Mesa using FVS modeling platform.



Source: Modeled data from typical spruce / fir stands on the Grand Mesa using FVS modeling platform.

Alternative 3

The direct and indirect effects of implementing Alternative 3 will be similar to that of implementing Alternative 1 (proposed action), however it is unclear whether limitations in acreage treated will allow this alternative to be as effective as the proposed action. This alternative was created on the input from scoping to attempt to better quantify the amount of acreage to be treated in a given year. The Interdisciplinary Team (IDT) decided that the levels of 400 acres in spruce and 120 acres in aspen is probably the most that could be planned for and treated in a given year with current levels of funding and staff. If populations increase exponentially these limits would certainly not allow for treatment of all actively infested areas on the Grand Valley District.

Sudden Aspen Decline Effects

Alternative 1

Actions proposed in Alternative 1 which include cleanly cutting affected stands and other non-commercial methods (including hydro-axing or prescribed burning) would regenerate healthy fully stocked aspen stands. Aspen is a very shade intolerant species and requires full sunlight in order to achieve a successful regeneration response.

Research has shown that regeneration response (after harvesting) in aspen stands which have greater than 70% crown mortality can be somewhat modest and may not be adequate in

regenerating fully stocked aspen stands. It may be more detrimental to harvest these sites due to potential damage to existing aspen suckers in these stands. For this reason, harvesting and regeneration activities will likely be focused on areas which are moderately to heavily affected by SAD, with stands having greater than 70% crown mortality and low levels of advanced regeneration being avoided for the most part using large commercial operations. Low impact fire wood cutting operations, hand felling or prescribed burning operations may be used to regenerate portions of these stands, excluding heavy equipment. Maintaining even small portions of these stands may allow for eventual recapturing of these stands by aspen.

Use of non-commercial methods such as hydro-axing (mastication) and prescribed fire will adequately regenerate aspen stands as mentioned, improving stand health. However as with commercial operations it is important to follow general and site specific design criteria and BMP's.

Alternative 2

Without proposed treatments, some SAD affected aspen stands will continue to decline and will likely die and convert to other vegetation types or to a mixed vegetation type with aspen remaining as a minor component of the stand. It appears that the current extent of affected aspen is somewhat static in the absence of subsequent triggering climatic events (Worrall, 2010). Stands that are presently affected by SAD will likely continue to worsen. Potential shifts in cover types may be permanent, but in some cases aspen may regain prominence as a result of future disturbances such as a fire.

Alternative 3

The direct and indirect effects of implementing Alternative 3 would be similar to the effects of implementing Alternative 1 (proposed action); however it is unclear whether limitations in acreage treated will allow this alternative to be as effective as the proposed action. The Interdisciplinary Team (IDT) decided that the level of 120 acres in aspen is probably the most that could be planned for and treated in a given year with current levels of funding and staff. Approximately 13,000 acres on the Grand Valley District are affected at this point. It will likely be necessary to analyze subsequent treatment operations in areas of the district to properly manage this situation.

Insect and Disease Cumulative Effects

Alternatives 1 and 3 begin to address some of the past and ongoing factors which have set the stage for the spruce beetle outbreaks and sudden aspen decline across the Grand Valley District. Both spruce dominated stands and aspen stands are in general very old and have lacked meaningful disturbances (man-made or natural). The action alternatives will begin to regenerate some of these affected stands creating new ages classes across the landscape which will be crucial in the long run, promoting forest resilience to future insect and disease problems. These actions would compliment efforts of other ongoing and planned operations. Without a management strategy that will diversify forest structure and age classes, this threat will continue to be present for future generations who use the forest for their livelihood, for recreation and other uses.

Diversity Effects

Alternative 1

The proposed treatments would add some diversity to the forested ecosystems of the Grand Mesa and the Uncompahgre Plateau. Biological diversity (forest vegetation) can be defined as having variability of forest stand conditions over the landscape including multiple age and size classes, varying forest stand densities, and varying species composition. The results of spruce beetle treatments would continue to foster efforts at promoting an uneven age structure in stands where ITS and group selection harvesting would be performed. This would occur due to regeneration of spruce and fir in the understory and in gaps. This would promote an additional age class in most stands treated. It is likely that a majority of the regeneration in ITS treatment areas would be sub alpine fir due to its shade tolerance, and would certainly increase the proportion of this species in the for-seeable future. The general stand structure would likely trend towards a more inverse "J" curve distribution, which includes higher amounts of small and medium sized trees. This distribution would actually better mimic a stand structure where there are periodic natural disturbances, such as in old growth stands. New age classes in areas treated with group selection openings would likely be dominated by spruce regeneration. Gottfried (1991) demonstrated that group selection, patch clear cuts and ITS in old growth stands maintained and enhanced an uneven aged stand structure, improved stand vigor, and were compatible with other land uses.

Aspen treatments would also promote "horizontal" diversity by creating a mosaic of new age class "patches" across the landscape. Currently the landscape is dominated by late seral (old) and decadent aspen stands.

Management actions will contribute to the maintenance of aspen cover in its current range. Even with the proposed action and independent projects to regenerate SAD affected stands, still some affected aspen stands will likely not be treated and may revert to other vegetation types. It is also possible on some sites that the stand may shift to a vegetation community where aspen is a minor component.

Alternative 2

It is possible that taking no action may be a contributing factor to the infestation reaching the proportions where a majority of standing spruce could be killed. This would likely set in motion a short-term subalpine fir dominance in these stands lasting for decades. However this would eventually be replaced by spruce dominated stands as spruce becomes re-established and eventually out-competes or replaces the subalpine fir (silviculture report). This would likely set the stage for another period where the landscape is dominated by even-aged spruce stands with limited age class diversity. And again, future generations would have to deal with risks of potential landscape level changes in the ecosystem, which are not considered appropriate given stake-holder demands and needs of National Forests.

The no action alternative would affect aspen somewhat differently. No action, would likely contribute to loss of aspen forests on the Grand Valley District. Many of the stands would likely convert to other vegetation cover types in part or in whole. This shift would likely be to shrub dominated communities (including Gambel oak) and in some instances conifer cover types. As mentioned previously loss of aspen acreage in its present range is not preferable (GMUG Amended Forest Plan, 1991).

Alternative 3

The direct and indirect effects of implementing Alternative 3 would be similar to the effects of implementing Alternative 1 (proposed action); however it is not likely to be as effective as the

proposed action in improving diversity values in certain areas. This alternative was created based on input from scoping to attempt to better quantify the amount of acreage to be treated in a given year. The Interdisciplinary Team (IDT) decided that the levels of 400 acres in spruce and 120 acres in aspen is approximately what could be reasonably planned for and treated in a given year with current levels of funding and staff.

Forest Health Effects

Alternative 1

The proposed action would improve general forest health in areas treated. The change in health condition would be immediate and sustained in both aspen and spruce dominated stands due to the nature of the issues. In spruce dominated stands, ITS and group selection would remove actively infested trees in forest stands, which would immediately remove a source for emerging spruce beetles which poses a risk to neighboring trees and surrounding stands. In total these operations would reduce the amount of spruce beetle emerging across the Grand Mesa and may reduce new infestations of previously unaffected stands, in certain areas. The operations in spruce / fir stands would also reduce the stocking which would improve vigor in the remaining trees, which would improve the odds that the remaining trees could successfully ward off future attacks. New age cohorts created by group selection harvesting would be fast growing and virtually immune to beetle attack for many decades.

In aspen dominated stands, old, declining stands affected by SAD would be harvested cleanly allowing for the regeneration of healthy fast growing aspen saplings. The harvesting and removal of aspen timber which is infected by pathogens such as fungal diseases would reduce the risk of spread into neighboring stands.

Alternative 2

The No Action alternative would likely contribute to the continued diminished health of both aspen and spruce dominated stands on the Grand Mesa and Uncompahgre Plateau. Without treatments such as ITS and group selection which would promote improved tree vigor and the establishment of new vigorous age classes, forest health presently and in the future would continue be at risk. The extent of the SAD affected aspen appears to be more static at this point than does the spruce beetle outbreak in Colorado. However, without treatment in stands currently affected, stand health would continue to decline until complete or partial mortality of the stand occurs. The amount of inoculums associated with fungal disease agents would remain high and may affect neighboring stands contributing to the overall decline of aspen on the District.

Alternative 3

The direct and indirect effects of implementing Alternative 3 would be similar to the effects of implementing Alternative 1 (proposed action). This alternative was created on the input from scoping to attempt to better quantify the amount of acreage to be treated in a given year. The Interdisciplinary Team (IDT) decided that the levels of 400 acres in spruce and 120 acres in aspen is probably the most that could be planned for and treated in a given year with current levels of funding and staff.

Diversity and Forest Health Cumulative Effects

The action alternatives would contribute to a divergence from a trend of aging forests where a majority of aspen and spruce dominated stands are mature to over-mature. In certain areas of the district sanitation and salvage treatments would likely improve forest health conditions in stands which are experiencing attacks by spruce beetles by reducing the amount of spruce beetle life forms in spruce stands in certain areas. Stand manipulations would improve individual tree vigor allowing trees to better defend themselves from attacking beetles. It is unclear if beetles return to these areas years later whether they would be able to withstand subsequent attacks; however treatments certainly increase those odds.

The no action alternative would contribute to a continuance of trends which have promoted an aging and densification of our aspen and spruce dominated forests and as a result are very uniform. Although inaction in the short term may contribute to dramatic landscape changes, these are somewhat temporal, especially in spruce dominated stands. We would essentially be passing the problems of today to future generations of forest managers and users of the National Forests.

Commercial (Timber Sales) and Noncommercial Treatments Economics Effects

Alternatives 1 and 3

Alternatives 1 and 3 propose the sale of approximately 52,880 CCF (hundred cubic feet) of saw timber and small-diameter forest products within sale areas of approximately 520 acres, per year or 3640 acres in total. This is based on the assumption of current staffing and funding levels. Based on historic data and examination of current market conditions, the sale would yield discounted revenues of approximately $623,724 in timber sales, or $13.97 per CCF. The discounted direct costs associated with the sale total $523,533 (see **Table 8**). The computed cost-benefit ratio for Alternatives 1 and 3 is 1.2. The discounted net gain for the project is $100,200 for the Federal Government and thus can be considered a cost-effective action.

Alternatives 1 and 3 include several potential non-commercial options as an alternative to a commercial timber sale such as prescribed burning in aspen and mastication in aspen and some spruce stands. The benefits cannot be quantified monetarily; however the analysis shows the advantage to the government of performing commercial operations where they are feasible. Estimated net present costs are presented in **Table 9**.

Table 8: Economic analysis figures for the commercial timber sale portion of the Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments (2011) assuming all 520 acres treated by commercial means.

Activity	NPV	
	Alternatives 1and 3	Alternative 2
a) timber sale receipts	$ 623,734	$ -
total discounted value.....	**$ 623,734**	$ -
a) NEPA expenses (specialist time/surveys)	$ 21,675.00	$ -
b) site specific consultation (IDT)	$ 53,390.67	$ -
b) contract preparation time	$ 55,876.40	$ -
a) timber prep supplies-paint	$ 70,580.71	$ -
b) timber prep supplies-flagging	$ 2,100.62	$ -
c) timber crew time	$ 200,958.97	$ -
d) timber crew vehicle costs	$ 31,369.20	$ -
e) small sales forester time	$ 33,525.84	$ -
f) forester vehicle costs	$ 5,041.48	$ -
g) sale admin	$ 49,014.38	$ -
total discounted costs.....	**$ 523,533**	$ -
disc.revenues - disc.costs	$ 100,200	$ -
revenue per acre	$ 38.00	
cost benefit ratio	**1.2**	**0**

Alternative 2

Alternative 2 would result in no benefits, income or cash outlays for the Federal Government.

Table 9: Discounted cost figures for the treatments not part of the commercial timber sale portion of the Grand Valley Spruce Beetle and Sudden Aspen Decline Treatments (2011) assuming 60 acres treated per year with non commercial methods out of 520 acres treated total.

Activity	NPV	
	Alternatives 1and 3	Alternative 2
a) precribed burning (initial)	$ 90,729	$ -
b) precribed burning (maintain)	$ -	$ -
c) mastication	$ 133,674	$ -
total discounted costs.....	$ 224,404	0
cost per acre	$ 497.00	

Cumulative Economic Effects

Under Alternatives 1 and 3, the main cumulative economic effect of the Grand Valley District Spruce Beetle and Sudden Aspen Decline Treatments EA is the positive socio-economic impact to the forest products industry, its employees, and local communities. Such projects help to bolster this sector of the local economy which depends on federal timber to supply raw material needs. Affected industries include logging, primary wood-producing facilities and value-added industries such as furniture and homebuilding. These industries provide numerous job opportunities in the region. Additionally, people employed with the forest products industry purchase goods and services in the communities that they work and live in, supporting other small businesses such as restaurants, grocers, and supply stores. This is commonly referred to as the "multiplier effect".

Under Alternative 2 there may be a negative cumulative socio-economic impact to the industry, employees, and local communities, due to impacts on federal timber supply.

Cultural

In evaluating the cultural resource the Forest Service would follow the procedure set forth in Amendment Three for the Programmatic Agreement among the Advisory Council on Historic Preservation, The Colorado State Historic Preservation Office and The USDA Forest Service.

The Colorado SHPO and the Forest have agreed that these procedures would ensure that there would be no adverse effect and no significant impact to cultural resources from the SAD/beetle infestation proposals.

Fuels

As spruce beetle infestations continue to attack and modify the spruce/fir landscape across the Grand Mesa, the potential build-up of moderate to heavy accumulations of both natural and activity fuels (fuels resulting from salvage and sanitation harvesting) increases.

Based on predictions regarding the future potential of the spruce beetle infestation, affected stands would begin to shift towards increased amounts of downed and standing dead trees.

In spruce dominated stands, the most representative fuel model describing fuel conditions and potential resultant fire behavior throughout the analysis area is Fuel Model (FM) 10. This FM is indicative of conifer types that are over-mature and are beginning to exhibit signs of breakup due to insect or disease, wind-throw or accumulation of dead material due to normal mortality. Fuel loading will generally range from 9 to 20 tons per acre (tpa). Woody material in the 3 to 9 inch size class makes up the majority of the residue on the forest floor with approximately 20% of this material being rotten. Typically the fuel bed profile is 1 to 2 feet in depth.

In aspen stands Fuel model 8 best represents hardwood stands where debris on the forest floor has been compacted, the over-story has begun to leaf out and there is little other understory vegetation present. Only under the most severe fire weather conditions would this FM pose any type of fire suppression problems. Dead fuel loads range from 1 to 2 tpa with an average fuel bed depth of .2 feet or less. In aspen stands where surface litter/debris is loosely compacted Fuel model 9 would be most appropriate. These conditions would be similar to those found in hardwood stands in the fall after leaf fall but prior to significant snow. Dead fuel loads range from 2 to 4 tpa with an average fuel bed depth of approximately .2 feet. This fuel model would produce fire intensity and rates of spread higher than would be expected with FM 8, especially if the fire start is adversely affected by wind or slope. Although this type of fire may become fairly intense, they are generally of short duration and can be readily controlled in most situations.

Spruce Fuels and Fire Behavior Effects

Alternatives 1 and 3

The direct and indirect effects for Alternatives 1 and 3 are discussed together due to the fact that effects would be identical on acres treated with sanitation and salvage operations.

In areas where sanitation and salvage operations (including ITS and group selection) are proposed in spruce stands, there would be a short term increase in fuel loading in the smaller diameter classes. These fuels would mainly consist of tree tops and branches six inches and less in diameter. Total fuel loading could approach 35 to 40 tons per acre and modify the fuel model from fuel model 10 to fuel model 12; however this effect is expected to be very short lived due to the design criteria associated with Alternatives 1 and 3. Specifically:

- Within group selection harvest units, the logging slash would be lopped and scattered to a maximum height of 24 inches not to exceed 25 to 30 tons per acre.
- Within ITS harvest areas, slash would be lopped and scattered to a maximum height of 24 inches, not to exceed 25 to 30 tons per acre.
- Some larger diameter slash would be yarded and burned, or lopped into short lengths as described in the silviculture design features to reduce beetle reproductive habitat.

Fire intensity is directly dependant on the amount of dead material available, continuity (horizontal and vertical) of the fuel bed, fuel moisture, amount and condition of the fine dead fuels, amount of ladder fuels available and the time of year (fall is normally the most susceptible season for successful ignition and large fire growth within the analysis area). The design criteria mentioned above is designed to lower the fuel bed depth and to compact the fuel profile immediately following harvest. These actions would result in a fuel bed which is less flammable

or susceptible to successful spread or rapid fire spread. This action also speeds the decomposition process, bringing debris closer to the forest floor. Most logging slash would be generated during the months of June through October and the slash would not dry and cure substantially prior to heavy snowfall. Once snowpack has been established, fuel bed depth would be compacted even further. During the following summer, the slash would continue to dry and needle color would turn to gray and begin to drop from branches. The next summer after another winter of snow-pack, most of the needles and fine branches would drop from the slash and be incorporated into the duff layer of the forest floor. Also some of the smaller woody debris would have begun to break down and decay. The slash bed would likely be interspersed with green grass, shrubs, and forbs which would create discontinuity in the fuel bed. In addition the area has a late spring, a short summer, and an abundance of summer precipitation. Overall increased fire hazard (ignitability) would be minimal during this two-year period of slash break down and decomposition.

The proposed silvicultural treatments of ITS and group selection harvesting would reduce stand densities and break up the continuity of dense spruce stands. The treatments would increase crown spacing in treated ITS stands making then more unlikely to carry an active crown fire

The net effect of implementing Alternatives 1 and 3 would be a short term increase in fine fuel loading. After approximately two years, the fine fuel loading would be no more hazardous than under natural conditions had management not occurred.

Alternative 2

The no action alternative would contribute to sustained increased fuel loading and associated higher burn intensities of FM 11, 12 and 13, in the event of successful ignition and spread. Non treatment would result in much heavier fuel loading as compared to post treatment stands, where design criteria are to be implemented to influence fuel loading and fuel arrangement.

Aspen Fuels and Fire Behavior

Alternatives 1 and 3

The direct and indirect effects for Alternatives 1 and 3 are discussed together due to the fact that effects would be identical on acres treated with sanitation and salvage operations.

In areas where sanitation and salvage operations (including regeneration harvesting of affected aspen stands) are proposed, there would be a short term increase in fuel loading in the small to large diameter classes (0 to 14” at dbh). These fuels would mainly consist of tree top s and branches six inches and less in diameter. There would also a considerable amount of fuels consisting of large diameter cull logs left on the forest floor Total fuel loading could approach 35 to 40 tons per acre and modify the fuel model from fuel models 8 and 9 to fuel model 11 and 12 in certain areas; however this effect is expected to be short lived due to the rapid decay rate of aspen slash and due to design criteria applied;

- Within harvest areas, slash would be lopped and scattered to a maximum height of 24 inches, not to exceed 25 to 30 tons per acre. Some piling may be used in certain areas if slash exceeds 30 tons per acre

The design criteria mentioned above is designed to lower the fuel bed depth and to compact the fuel profile immediately following harvest. These actions would result in a fuel bed which is less

flammable or susceptible to successful spread or rapid fire spread. Most logging slash would be generated during the months of June through October and the slash would not dry and cure substantially prior to heavy snowfall.-Once snowpack has been established, fuel bed depth would be compacted even further. During the following summer, the slash would continue to dry and small branches would begin to fall to forest floor. The following growing season the slash bed would be interspersed with green grass, shrubs, and forbs which would create discontinuity in the fuel bed. In addition the area has a late spring, a short summer, and an abundance of summer precipitation. Overall increased fire hazard (ignitability) would be minimal during this two-year period of slash break down and decomposition.

Aspen stands on the Grand Mesa and Uncompahgre Plateau do not burn easily, and the environmental conditions which are conducive to burning are somewhat rare, only typically occurring in fall after a killing frost accompanied with low fuel moisture content. The proposed silvicultural treatments of clear felling affected aspen stands would break up continuous expanses of dense aspen stands. In a stand that's relatively healthy, and regeneration has begun (after treatment as prescribed in Alternatives 1 and 3), has some downfall and also has an oak understory, a wildfire may penetrate the leading edge of the stand and kill and consume that edge of the stand up to a certain point (dependant on weather, topography and ground fuels). Normally, the fire would then moderate in intensity and begin to follow the "fuel path" which is usually downed logs or other fuel accumulations.

The net effect of implementing Alternatives 1 and 3 would be a short term increase in fuel loading. After approximately two years, the fine fuel loading would be no more hazardous than under natural conditions with no management under taken.

Alternative 2

Under the No Action Alternative, sanitation and salvage operations would not be conducted to remove dead and dying trees and regenerate healthy aspen stands. No logging slash would be created. The aspen cover types would continue to remain as a fuel model 8 or 9 in the short term. Over time, fuel loadings would increase due to increased SAD mortality, and wind events. Fuel models would more closely resemble models 10, or 11, based on the amount of slash accumulated from dead and dying timber. These models could have fuel loads ranging from 12 to 25 tons per acre based on observations of SAD affected sites.

In a stand that has experienced heavy mortality (similar to untreated SAD affected stands – Alternative 2 –No Action) and beginning to accumulate a heavier downed component , a wildfire once established, would become a slow spreading , moderately intense burn. There would be a tendency for the fire to consume the downed material, possibly exhibit short-term spotting and generally be more of a moderately long term event if left unmanaged. Once the available downed material is consumed, the fire should go out on its own.

Cumulative Effects

Aspen stands on the Grand Valley District are quite old and decadent, and historically these stands have not been subject to damaging wildfires due to the fact that they are typically on located on moist sites and the needed environmental conditions for a running fire are quite rare.

However these old stands are susceptible to general stand decline due to reduced vigor. The phenomenon of sudden aspen decline (SAD) has caused heavy mortality in affected stands which has raised the concern and possibility of fire of moderate duration if left un-managed.

Under management (Alternatives 1 and 3) these sites would be regenerated and slash would be managed which would lower the risk of a moderate fire event in future years.

Lands and Minerals

Private Property Effects

Alternatives 1 and 3

Should the proposed action result in timber sales being planned adjacent to private property, there is the possibility of fences being damaged and trees removed from the private land. Access roads to those private parcels, for which the private landowner is responsible for maintenance, could be affected by timber activities, and the potential exists for damage to water facilities (i.e., crushing of water pipeline). Timber sale activities could negatively impact water sources associated with the private property.

There could also be a need for access across the private property in order to remove trees. In those instances, it would be necessary for the Forest Service to negotiate either temporary or permanent rights-of-way with the landowners.

Alternative 2

Alternative 2 (No Action) would result in no impacts from commercial or non-commercial operations being analyzed in this EA.

Special Uses Effects

Alternatives 1 and 3

There is the potential for timber harvesting activities to damage special use facilities or interfere with their operation and maintenance.

Timber harvesting could also provide a benefit to special use permit holders. Many times, trees are growing on or near the dams, which can be a threat to the dam's integrity. Power lines and communication site permittees could have trees growing close to the facilities, and other permittees need to remove trees on access routes to their facilities in order to get equipment to the site. If those trees needing to be removed can be sold as part of a sale under the proposed action or Alternative 3, the permittees could accomplish their goals, the Forest Service could have less paperwork to prepare, and the timber sale operator could purchase additional timber.

Alternative 2

Alternative 2 (No Action) would result in no impacts from commercial or non-commercial operations being analyzed in this EA.

Minerals Effects

Alternatives 1 and 3

Because the mineral material pits were developed to accommodate Forest Service needs, effects would continue to be the same as in the past. Removal of the material would be conducted according to the pit plans developed for the pits in order to reduce impacts on resources, while allowing maximum use of the sites. Because of the lack of pits on the Uncompahgre NF,

material might have to be hauled from Grand Junction, which would increase wear and tear on roads. It could become necessary to identify a suitable mineral material site on the Uncompahgre NF to reduce costs and time needed for timber harvesting there. If that were to become necessary, additional environmental analysis would be required to authorize development of a pit.

As in the case of special use facilities, implementation of the proposed action or Alternative 3 could provide a benefit to oil and gas operators needing to clear well pads. Early coordination with the lessees would be required in order to reduce conflicts between the various activities.

Alternative 2

Alternative 2 (No Action) would result in no impacts from commercial or non-commercial operations being analyzed in this EA.

Cumulative Effects

Cumulative effects on private property, special use facilities and mineral materials are not expected to be different from those experienced in the past for similar projects. Other than the reduction of mineral materials available for future use in some of the Forest Service's pits, any effects would be short-term in nature.

Soil and Water Resources

The analysis area includes portions of the Grand Mesa / West Elk Soil Survey Area (CO660) published in 2008, the Uncompahgre National Forest Soil Survey Area (CO676) published in 1995, and the Mesa County Area (CO680) published in 1978. The surveys are all considered to be *3rd order* level surveys mapped at a 1:24,000 scale, which is a level of mapping intensity intended for areas with a single dominant use, where precise knowledge of small areas is not required. Soil surveys are useful tools for identifying general suitability of land uses. However, because they are *3rd order* surveys as well as the inherent variability of soils; specific project proposals generally need to be reviewed to confirm slope, depth, drainage, and other soil and site characteristics that may affect a particular use.

Soils on the Grand Mesa portion of the analysis area have developed from two principal sources. Along the 'planer' summit they are derived from glacially reworked volcanic basalt, and are cold, high elevation soils that are quite typical for Spruce-fir forests at high elevations in the Rocky Mountains. Spruce beetle activity is confined to these soils, with nearly 90% of the activity identified during recent aerial reconnaissance surveys (2005-2010) occurring on 10 mapping units; and 90 % of the 2010 observations limited to 3 mapping units. The soils are generally deep, well drained, and contain considerable amounts of coarse fragments (gravel to cobble size materials) within the profile. The predominant parent material of soils moving to the east (near Leon Creek) and around the perimeter of the Grand Mesa is a glacial or colluvial admixture of basalt and underlying sedimentary formations (Wasatch, Ohio Creek, Uinta, and Green River). These soils are lower in elevation and are dominated by aspen with an occasional Spruce-fir component. Aspen stands afflicted by SAD occur on these soils, with nearly 60% of all district-wide affected acres occurring on six mapping units on the Grand Mesa. These soils are typically finer textured loams and clay loams with fewer coarse fragments, very deep, and well drained.

Soils on the Uncompahgre Plateau have developed in sedimentary parent materials (Wingate, Summerville, and Entrada formations). They are lower in elevation, warmer, and drier than those on the Grand Mesa. 22 % of the SAD affected acres identified in the proposed action occur on four mapping units on the Plateau. These soils vary more widely in terms of depth (shallow to deep) and coarse fragment content within the profile (none to 35% +). They are all well drained and generally coarser textured (loam to sandy loams) than the soils supporting aspen on the Grand Mesa.

Currently all of the soils are relatively free of erosion even on steeper slopes (≥ 40%), due to the prevalence of undisturbed protective ground cover. General erosion hazard ratings are available that characterize the potential risk of soil loss after a disturbance that exposes bare soil. The ratings are based on soil erodibility factors and prevailing slope, with slope determining the level of risk for these particular soils. Ratings are presented for all lands within the analysis area in **Table 10** (NRCS, National Forestry Manual, 1998).

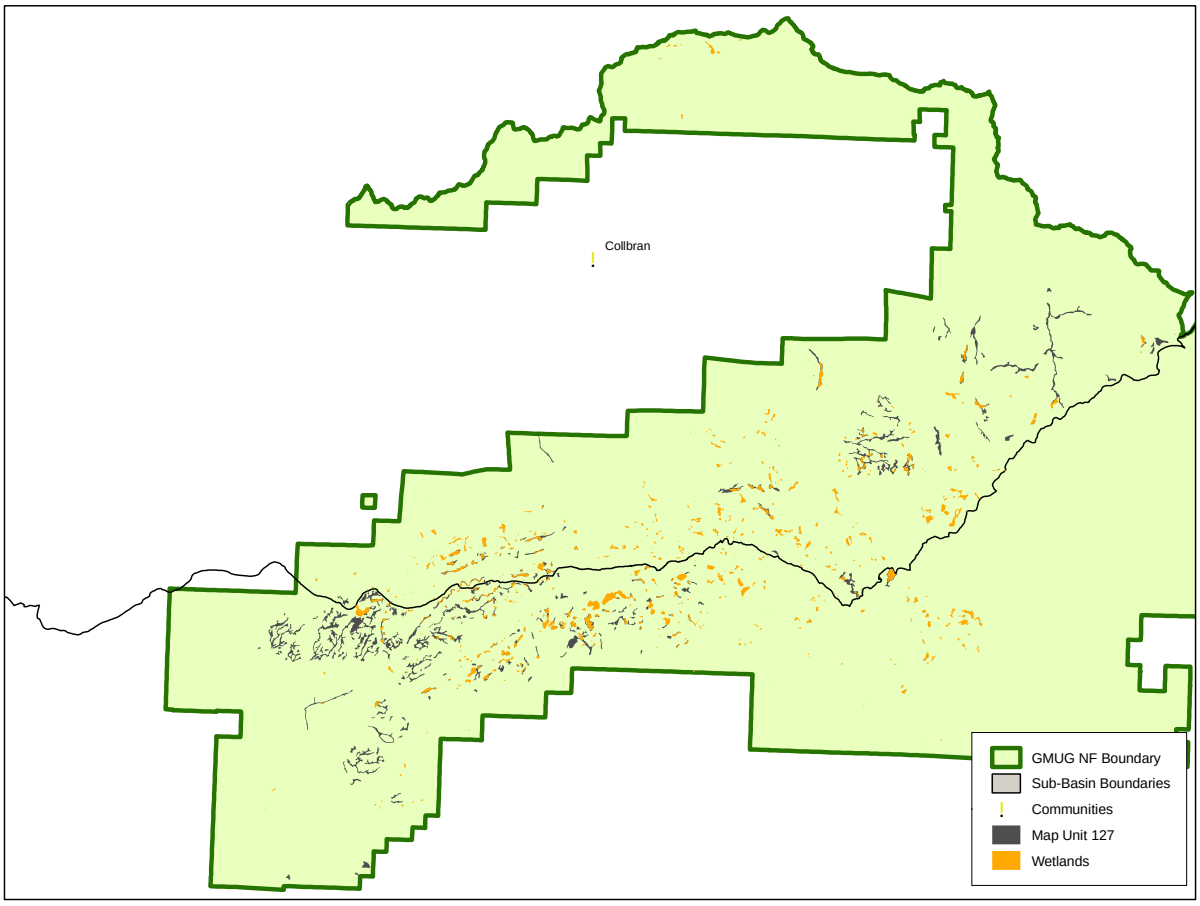
Table 10. Soil erosion risk ratings and extent across the analysis area.

Risk	Slope %	% of Total Area
slight	< 15	50.0
moderate	15 - 35	36.8
severe	36 - 50	8.2
very severe	> 50	5.0

Source: NRCS, National Forestry Manual, 1998

Frequently flooded very-poorly drained soils which support wetland or riparian vegetation have previously been mapped across the Grand Mesa portion of the analysis area (map unit #127). They are found in the low gradient upper reaches of drainages, or as isolated depressional features and are readily identifiable, because they do not support forested cover. They are most common in the Spruce-fir zone, with the highest concentrations present in the Kannah and Leon Creek sub-watersheds. Some of them have soils and plant communities that are sustained by near surface groundwater in-flows (or include portions that are), which are actively accumulating peat. These organic matter rich sites are a rare type of wetland, referred to as a fen. A recent forest-wide wetland inventory was conducted, to supplement existing soil survey information. The distribution of potential wetlands and fens identified during both efforts within the general analysis area is provided in **Figure 3.**

Figure 3. The distribution of soil Map Unit 127 and wetland inventory delineations.



Source: GMUG GIS database, GMUG Forest Supervisors Office, Delta, Colorado.

Water Resources – Runoff Effects

Alternatives 1 and 3

In the snow-melt driven hydrologic systems of Colorado, the greatest harvest related water yield increases occur in sub-alpine climatic settings. The increases are caused by a reduction in both growing season evapo-transpiration and winter season interception losses (Troendle and King, 1987); and the magnitude of change is directly proportional to the level of canopy removal as well as mean annual precipitation (McDonald and Stednick, 2003). Spring and early summer snow-melt derived peak flows are also enhanced, due to more rapid melt rates (McDonald and Stednick, 2003). Response in the lower elevation montane aspen zone is considerably less because both mean annual precipitation and winter season interception losses are less. The degree of canopy removal is typically measured in terms of percent basal area reduced, with flow increases generally not being measureable until about 25% or more of the basal area is removed (USFS, 2006).

Table 11 summarizes the amount of 'accessible' Spruce-fir (non-roadless, within 1 mile of an existing system road, plus a potential 1000 foot additional average yarding distance) and the proportion of the entire sub-watershed area that the acreage represents for all the sub-watersheds in the analysis area (based on the forest-wide GIS layer of potential natural vegetation). The results can be considered an estimate of the maximum spruce-fir acreage that could be treated under each action alternative, given the accessibility constraints.

Table 11. Accessible Spruce-fir acreage and its proportion by sixth level watershed.

HUC6 Code	Name	Total HUC6 Acres	Spruce-fir Acres	% Spruce-fir
140100051101	Owens Creek	10,339	1	0.0
140100051102	Headwaters Buzzard Creek	21,489	224	1.0
140100051103	Hightower Creek-Buzzard Creek	17,945	0	0.0
140100051104	Middleton Creek	14,265	0	0.0
140100051105	Harrison Creek-Buzzard Creek	10,592	0	0.0
140100051106	Brush Creek	11,327	0	0.0
140100051107	Collier Creek-Buzzard Creek	17,321	0	0.0
140100051108	Hawxhurst Creek	17,668	0	0.0
140100051201	Leon Creek	28,702	3,592	12.5
140100051202	Vega Reservoir	21,975	0	0.0
140100051301	Grove Creek	16,575	743	4.5
140100051302	Big Creek	20,366	5,520	27.1
140100051303	Kimball Creek-Plateau Creek	18,210	0	0.0
140100051304	Cottonwood Creek	14,313	2,668	18.6
140100051305	Bull Creek	14,639	1,397	9.5
140100051307	Coon Creek	11,373	277	2.4
140100051308	Mesa Creek	21,685	1,024	4.7
140100051309	Spring Creek-Plateau Creek	18,307	0	0.0
140200040505	Headwaters Leroux Creek	28,432	2,852	10.0
140200050101	Dry Creek-Currant Creek	18,916	0	0.0
140200050106	Kiser Creek	21,801	1,755	8.1
140200050107	Dirty George Creek	20,224	803	4.0
140200050108	Ward Creek	14,806	2,358	15.9
140200050109	Oak Creek	14,310	30	0.2
140200050111	Surface Creek	29,332	4,962	16.9
140200050112	Negro Creek-Tongue Creek	16,198	0	0.0
140200050114	Dry Gulch-Gunnison River	18,116	0	0.0
140200050301	Middle Fork Escalante Creek	21,540	0	0.0
140200050302	East Fork Escalante Creek	15,233	0	0.0
140200050303	North Fork Escalante Creek	24,917	0	0.0
140200050401	Smith Creek-Big Dominguez Creek	22,916	0	0.0

140200050402	Rose Creek-Dominguez Creek	29,949	0	0.0
140200050502	Alkali Creek	20,844	0	0.0
140200050603	North East Creek	21,682	0	0.0
140200050702	Headwaters Kannah Creek	38,178	7,564	19.8
140200050704	Indian Creek	20,003	0	0.0
140300010301	Headwaters Little Dolores River	11,133	0	0.0
140300030706	Atkinson Creek	22,153	0	0.0
HUC6 Code	Name	Total HUC6 Acres	Spruce-fir Acres	% Spruce-fir
140300040101	North Fork Mesa Creek	35,281	0	0.0
140300040102	South Fork Mesa Creek-Mesa Creek	30,400	0	0.0
140300040301	Headwaters West Creek	32,762	0	0.0
140300040302	North Lobe Creek-West Creek	28,580	0	0.0
140300040304	Ute Creek-West Creek	21,896	0	0.0
140300040402	Calamity Creek	30,138	0	0.0
140300040403	Blue Creek	24,731	0	0.0

Source: GMUG GIS database, GMUG Forest Supervisors Office, Delta, Colorado.

These results suggest only complete canopy removal of spruce / fir in the Big Creek sub-watershed would remove the 25% of basal area necessary to generate a measureable flow response. All remaining sub-watersheds contain an accessible spruce / fir component that comprises less than 25% of the entire watershed. Given the partial canopy removal treatment prescription (single tree selection and group selection) being proposed; no effects to runoff characteristics are expected within the spruce / fir zone under either Alternative 1 or 3.

The effects of SAD on the nature of the water budget of aspen dominated stands are an unknown. However, it is reasonable to assume that successful regeneration of those stands would maintain or re-establish the historic runoff regime. Measureable runoff impacts are unlikely from the proposed aspen treatments given that canopy interception losses and mean annual precipitation are both less in the montane versus sub-alpine climatic zone, and the overall limited treatment acreage proposed.

Alternative 2

The no action alternative would result in short term losses of canopy cover that could affect flow regimes. The impact would depend on the climatic zone, the severity, and aerial extent of the losses. The changes would diminish as regeneration becomes re-established, and canopy closure is achieved. The long term consequences of permanent and widespread SAD induced aspen losses, and its replacement by other cover types on the hydrologic regime is unknown.

Water Resources – Water Quality Effects

Alternatives 1 and 3

Adverse water quality impacts would be avoided or minimized through implementation of the measures outlined in the Rocky Mountain Region Watershed Conservation Practices Handbook (WCPH) and the supplemental design criteria of this document. The WCPH includes measures that are recognized as effective and are considered to be Best Management Practices (BMP's) for silvicultural operations by the State of Colorado. The principal purpose is to protect beneficial

uses by disconnecting ground disturbances from the channel network and maintaining vegetative buffers adjacent to water related features. There is a risk for the introduction of sediment to stream courses under Alternatives 1 and 3, primarily due to temporary road construction rather than any directly related to harvest activities. Any increases in sediment production would be short term in nature and minimized through BMP implementation. Reestablishment of vegetation and road obliteration after use would reduce the production of sediment to background levels, so that long term impacts are not expected.

Alternative 2

Water quality and designated uses would be maintained under the no action alternative, although there is a slight risk of increased sediment inputs if a large scale die-off, is followed by a severe fire.

Soils Effects

Alternatives 1 and 3

Although both spruce beetle activity and SAD are widely distributed, potential mechanized treatments are restricted to areas outside of inventoried road-less; and by the proposed limitation on temporary road construction of ≤ 1 mile. Ground based yarding could extend potential treatments an additional +/- 1000 feet beyond temporary roads on average. Therefore, the area considered in order to evaluate direct and indirect watershed effects is based on the area within 1 mile plus 1000 feet of existing roads and excluding inventoried road-less.

The proposed treatments differ between Alternatives 1 and 3 only in regard to the upper limit of potential acres treated and temporary road needs on an annual basis. In spruce / fir stands, about 70% of the acres treated are expected to be individual tree selection and the remainder group selection openings of ≤ 2 acres. Treatment of SAD afflicted aspen would be through clear-cutting. Alternative 3 would allow treatment of up to 400 acres of spruce / fir and 120 acres of aspen, while Alternative 1 identifies a range with likely upper limits of 800 acres of spruce / fir and 240 acres of aspen. Alternative 1 poses the greatest overall risk to soil and water resources because more acres may be treated, and in all likelihood, there would be a need for more temporary road construction.

Ground disturbance is a direct effect that is inevitable in the project. However, detrimental soil impacts caused by equipment operations (compaction, displacement, and rutting) or post harvest erosion or pile burning would occur on a much smaller area. Detrimental impacts and quality standards are defined in the Region 2 Supplement to FS Handbook 2509.18. The actual extent of detrimental disturbance that occurs depends not only on the inherent soil and site characteristics, but also the weather conditions during operations, as well as contract administration.

The direct soil effects due to ground disturbance within activity areas are expected to be minimal, and of short duration. Post-harvest erosion risk is small, given the prevalence of slopes ≤ 35% and design criteria requiring retention of protective ground cover in the form of large wood and logging slash. Slash burning within treatment areas would be limited and severe effects restricted to burning of cull material concentrations at log landings. The impacts related to log landings and temporary road construction would be of longer duration given the typical blading and heavy use that they receive.

Impacts would be minimized by application of BMP's and the watershed related design criteria would limit the area of detrimental soil impacts (compaction, litter and surface soil displacement, rutting, erosion, severe burning) to the Regional standard of 15% or less of an activity area.

Alternative 1 has the potential for the greatest effect since more acres can be treated, and more temporary road construction would likely be necessary.

Avoidance of wetlands and fens, the identification of water influence zone (WIZ) areas, and development of appropriate BMPs during site examination and contract preparation would effectively eliminate any direct effects to these sensitive areas. There is a risk of an indirect effect on fens by disrupting the shallow ground-water regime necessary to sustain them. This could cause an impact by either reducing in-flows, or inadvertent lowering of the local water table. Disruption would most likely be related to road cuts or ditching associated with temporary road construction. The review of temporary road alignments and the development and implementation of appropriate BMP's would provide for adequate protection of these potential indirect effects.

Alternative 2

There is a slight risk of increased erosion under the no action alternative should a large scale die off occur followed by a severe fire.

Cumulative Effects

Historical uses and activities occurring within the sub-watersheds included in the analysis area are expected to continue at similar levels. Those that may have a cumulative effect on soil and water resources include canopy removal, livestock grazing, the existing road and trail system, recreational uses, and the existing water development infrastructure. They are either widespread and of low intensity or limited in extent and high intensity. Currently no adverse water quality effects are known, and the designated beneficial uses of water are being supported.

Generally, areas of complete or nearly complete canopy removal and the existing road network pose the greatest risk of effects to water quality and soil resources. Summarized in **Table 12** is the extent of canopy removal activities and system roads on National Forest lands by sub-watershed. Canopy treatments considered include even-aged silvicultural treatments, commercial thinning operations roller chopping, fuels chipping, and any permanent clearing of forested or brush dominated cover types within the last 25 years and currently tracked in the "FACTS" data base system.

Table 12. National Forest disturbance acreage and extent by 6th level watershed.

HUC6 Code	Name	Total FS Acres	Treated Acres	Road Acres	Percent of NFS
140100051101	Owens Creek	10,329	845	46	8.6
140100051102	Headwaters Buzzard Creek	21,489	399	69	2.2
140100051103	Hightower Creek-Buzzard Creek	17,626	509	89	3.4
140100051104	Middleton Creek	10,366	49	53	1.0
140100051105	Harrison Creek-Buzzard Creek	2,272	5	3	0.4
140100051106	Brush Creek	8,417	0	7	0.1
140100051107	Collier Creek-Buzzard Creek	2,626	0	0	0.0

140100051108	Hawxhurst Creek	7,774	0	0	0.0
140100051201	Leon Creek	27,666	133	68	0.7
140100051202	Vega Reservoir	15,399	6	13	0.1
140100051301	Grove Creek	5,850	82	16	1.7
140100051302	Big Creek	15,741	480	111	3.8
140100051303	Kimball Creek-Plateau Creek	7,696	0	8	0.1
140100051304	Cottonwood Creek	11,034	184	57	2.2
140100051305	Bull Creek	8,922	0	25	0.3
140100051307	Coon Creek	3,953	98	31	3.3
140100051308	Mesa Creek	7,822	434	49	6.2
140100051309	Spring Creek-Plateau Creek	3,813	0	2	0.1
140200040505	Headwaters Leroux Creek	22,412	289	62	1.6
140200050101	Dry Creek-Currant Creek	7,417	0	0	0.0
140200050106	Kiser Creek	8,980	103	65	1.9
140200050107	Dirty George Creek	9,648	17	21	0.4
140200050108	Ward Creek	9,216	110	76	2.0
140200050109	Oak Creek	4,906	0	32	0.7
140200050111	Surface Creek	19,688	117	83	1.0
140200050112	Negro Creek-Tongue Creek	2,769	0	31	1.1
140200050114	Dry Gulch-Gunnison River	820	0	7	0.8
140200050301	Middle Fork Escalante Creek	21,540	368	64	2.0
140200050302	East Fork Escalante Creek	14,017	209	25	1.7
140200050303	North Fork Escalante Creek	18,977	4,828	56	25.7
140200050401	Smith Creek-Big Dominguez Creek	22,916	253	141	1.7
140200050402	Rose Creek-Dominguez Creek	22,044	143	68	1.0
HUC6 Code	**Name**	**Total FS Acres**	**Treated Acres**	**Road Acres**	**Percent of NFS**
140200050502	Alkali Creek	2,293	0	7	0.3
140200050603	North East Creek	3,287	9	11	0.6
140200050702	Headwaters Kannah Creek	37,619	88	134	0.6
140200050704	Indian Creek	2,321	0	0	0.0
140300010301	Headwaters Little Dolores River	3,559	10	15	0.7
140300030706	Atkinson Creek	5,998	0	22	0.4
140300040101	North Fork Mesa Creek	12,776	606	74	5.3
140300040102	South Fork Mesa Creek-Mesa Creek	6,438	1	41	0.7
140300040301	Headwaters West Creek	21,726	5	85	0.4
140300040302	North Lobe Creek-West Creek	8,028	0	5	0.1
140300040304	Ute Creek-West Creek	5,567	76	4	1.4
140300040402	Calamity Creek	19,417	787	108	4.6
140300040403	Blue Creek	12,727	73	56	1.0

Source: Grand Mesa and Uncompahgre NF's FACTS database information.

These results reflect activities on all cover types from pinon-juniper through spruce / fir. The aerial extent of all these activities and roads is far less than 10% in almost all cases, with the lone exception of the North Fork of Escalante Creek where extensive roller chopping of pinyon-juniper and Gambel oak to improve wildlife habitat has occurred. These levels are well below those considered necessary to affect runoff, and are less than the regional standard for detrimental soil impacts as well. As a result, cumulative effects to watershed resources under either of the Alternative 1 or 3 are not anticipated.

Range

Rangeland Management Effects

Alternative 1

This alternative would have an overall positive benefit on livestock grazing due to lessening the risk of mortality of spruce and SAD aspen through various timber management treatments. Allotment boundary and pasture fences would be less likely to be damaged by deadfall and would be easier to access for maintenance and reconstruction purposes than in Alternatives 2 or 3. Better distribution of livestock and implementation of grazing systems would potentially be easier to achieve under this alternative, due to the reduction of deadfall and increased forage production due to removal of overstory. Increased forage production in timber harvest areas could also lead to improved riparian, open meadow and upland vegetative condition by improving the distribution of livestock. One negative impact would be that thinning dense stands of spruce that previously acted as barriers to livestock movement. New fences may need to be built to stop this movement and properly manage livestock.

Alternative 2

Under this alternative, the overall management of livestock grazing could be negatively impacted by mortality in both the mature spruce stands and SAD aspen areas. Allotment and pasture boundary fences located in these areas could be damaged by deadfall and would be more difficult to maintain and reconstruct. Damaged fences would make it more difficult to effectively manage the grazing systems prescribed on these allotments. Deadfall would also make it more difficult to move cattle through these areas, along with riders on horseback moving cattle and distributing salt. This has the potential to negatively affect grazing distribution. Some areas may become impassable.

Alternative 3

The effects of this alternative would be similar to the Proposed Action (Alternative 1), though proportionally smaller due to the potential for reduced treated acreage in both the SAD aspen stands and spruce beetle affected stands. There would be an overall positive benefit to grazing management, though to a lesser degree than Alternative 1.

Rangeland Management Cumulative Effects

Under Alternatives 1 and 3, overall forage production would be improved. Increased availability of forage in forested areas could reduce grazing impacts on adjacent riparian areas. Any increases in forage production due to opening of the over-story by mortality in Alternative 2 would eventually be offset by deadfall and loss of availability of forage, possibly increasing grazing impacts to meadows and riparian areas.

Noxious Weeds Effects

Alternative 1

Due to the scope of this alternative, it has the potential to negatively impact the incidence and distribution of noxious weeds within the project area due to soil disturbance from various harvest activities. Positive effects of the proposed action would be that increased pre-treatment surveys could disclose weed infestations we were previously unaware of and infestations would be treated to prevent their spread. In addition, access to these areas could be improved due to construction of temporary roads and skid trails, and the possible reopening of closed roads.

Alternative 2

In the short term, current noxious weed infestations would remain the same under this alternative. In the long term, infestations of weeds would slowly increase. Infestations may grow larger due to being undiscovered, and grow to the extent where control could be difficult. Increasing deadfall could also impede access, making chemical and mechanical treatment more difficult.

If a fire should occur in beetle kill fuel "jackpots" due to concentrations of deadfall, the higher surface temperatures generated by their burning would probably cause areas of hydrophobic soils. This could impede establishment of desirable vegetation and create a "niche" for the establishment of invasive species.

Alternative 3

This alternative has the potential to impact the spread of noxious weeds to a lesser degree than Alternative 1, due to the proportionally smaller area to be treated and the reduction of soil disturbance.

Recreation

Developed Recreation and Recreation Special Uses Effects

Alternative 1

In Alternative 1, the overall effect could be beneficial to developed recreation areas. Present resource conditions find an increased frequency of hazardous trees within some or most recreational developments and authorized improvements. The proposed action would allow for the timely identification and removal of dead and dying trees from developed recreation sites. Specifically, this is most common to areas of the Grand Mesa.

The developments include privately-owned resorts, organizational camps, recreation residences, outfitter-guide camps and government-owned visitor center, campgrounds, trailheads, and administrative facilities. Thus, many areas receive high public use and may require measures to ensure for public safety.

Log hauling and other associated project truck traffic has the potential to create user conflicts with recreational traffic especially at road intersections where project-related traffic turns onto NFSRs, for example Island Lake Road 116, Trickle Park Road 121, Old Grand Mesa Road 123 and State Highway 65. Log hauling traffic would impact access roads by repeated truck trips made throughout the duration of harvest activities when timber sales might be located in close

proximity to one another. To minimize user conflicts, timing restrictions may be necessary within the design of the specific timber harvest projects. These timing restrictions are primarily designed to avoid log hauling during the busiest recreational time periods, which are associated with weekends and holidays.

Alternative 2

In Alternative 2, the overall effect could be negative to developed recreation areas. Present resource conditions find an increase in frequency of hazardous trees within some or most recreational developments and authorized improvements. Specifically, this is most common to areas of the Grand Mesa.

Alternative 3

The effects of Alternative 3 would be similar to the Alternative 1. Present resource conditions find an increase in frequency of hazardous trees within some or most recreational developments and authorized improvements. In specific, this is concentrated to areas of the Grand Mesa.

Cumulative Effects

No cumulative effect would be attributed to the proposed actions under Alternative 1 or 3. An eventual increase in number of hazardous trees within high use public sites may occur under Alternative 2. This may result in a negative impact to commercial operations, government or private property, and public safety.

Dispersed Recreation and Trails Effects

Alternative 1

The proposed action would treat both current and future areas of infested timber stands that are distributed across many acres. Some trail corridors may benefit with the reduction of hazard trees. The proposed action would allow for the timely identification and removal of dead and dying trees from certain dispersed and trail recreation sites. Other effects on dispersed uses are neither beneficial nor negative, as treatments are limited in size and acres.

The dispersed recreation opportunities include 575 miles of summer trails, 185 miles of winter trails, unimproved trailheads, and isolated administrative facilities. Those specific areas with high public use and may require measures to ensure public safety.

Alternative 2

The treatment of both current and future areas of infested timber stands are distributed across many acres. Some trail corridors could be negatively affected without the reduction of hazard trees. No effect to dispersed recreation use would occur.

Alternative 3

The effects of Alternative 3 would be similar to Alternative 1. Treatment of both current and future areas of infested timber stands are distributed across many acres. Some trail corridors may benefit with the reduction of hazard trees, with a lessened degree than under Alternative 1. Other effects on dispersed uses are neither beneficial nor negative, as treatments are limited in size and acres.

Cumulative Effects

No cumulative effect would be attributed to the proposed actions under Alternative 1 and 3. An eventual increase in number of hazardous trees within high use trails may occur under Alternative 2. This may result in a negative impact to public access and safety on system trails.

Transportation

Timber harvesting activities can affect Forest roads in a variety of ways, depending on the existing condition of the road, the type of road and the intensity and duration of haul. Road use associated with vegetation management activities has the potential to affect road densities, public access opportunities, traffic flows, and road surfaces. Temporary roads may also affect road densities and access opportunities, temporarily. Any increase in road densities would be temporary and occur only during the life of the projects. Any temporary roads would be closed or obliterated after projects are completed.

Maintenance Level 3 and 4 Routes (passenger car route) Effects

Alternatives 1 and 3

Maintenance Level 3 and 4 routes which are suitable for passenger cars are typically gravel surfaced and have had some intensive road design completed prior to their construction, from the alignment to base course preparation through to the final surface course. Heavy loading of timber haul can over time cause rutting on even the well-designed routes that are considered to be in good condition. In addition, surface rock material is pushed over to the drainage ditch and some over fill slopes, especially on curves. Inner curves are left with little to no gravel and in some cases the shoulder is beat down to nothing.

Without adequate moisture and given the grade of most of these routes, wash-boarding occurs too frequently. Washboards are not just annoying, they are a safety concern.

Alternatives 2

Under alternative 2 there would be no effect to Level 3 and 4 routes due to no commercial or non-commercial treatments occurring as described in Alternatives 1 and 3.

Maintenance Level 2 Routes (four wheel drive) Effects

Alternatives 1 and 3

Level 2 routes are classified as four wheel drive routes due to their lack of surfacing material that creates a road that is not negotiable in wet weather with a passenger car. The route may also be rough and or on uneven terrain, requiring a vehicle with high clearance. They are typically very narrow. Most of these routes have not been designed to accommodate the critical vehicle traffic necessary for timber hauling. If timber hauling takes place on these routes without adjustments made to the road surface or alignment, inadvertent road widening may occur from over-running tires, especially on narrow radius curves. On many routes, rutting would occur in a short amount of time in wet OR dry conditions. The vertical curves of the road surface may not allow the travel of long wheel based log trucks. For routes where timber haul is expected, curve radius widening, surface hardening with crushed material, and in some cases, reroutes may be necessary.

Most level 2 routes on the Grand Valley District have numerous rolling dips, a necessary earthen structure constructed to roll the water off the road. When they begin to wear, they are cleaned and reconstructed. These structures are a very important device to decrease erosion, reduce sedimentation near waterways and hold the road together. Heavy haul and high amounts of traffic can knock down these structures quickly. Using the routes in saturated conditions also degrades the rolling dips.

Alternatives 2

Under alternative 2 there would be no effect to Level 3 and 4 routes due to no commercial or non-commercial treatments occurring as described in Alternatives 1 and 3.

Traffic Effects

Alternatives 1 and 3

The level of traffic generated by timber harvest activities would likely occur over a short amount of time and would consist of log trucks hauling commercial logs, as well as trucks hauling equipment and personnel in and out of treatment units. There would be an increase in traffic levels. This additional traffic would affect road conditions, as heavy trucks and other equipment have a more noticeable effect on road conditions in comparison to smaller and lighter passenger vehicles. Planned design criteria (see integrated design features) would minimize the effects of log truck traffic on roads in the analysis area, because existing NFSRs currently open for use would also receive pre-haul maintenance. In addition hauling over roads with asphalt surfacing would be restricted to frozen or dry sub-grade conditions.

Alternatives 2

Under alternative 2 there would be no effect to Level 3 and 4 routes due to no commercial or non-commercial treatments occurring as described in Alternatives 1 and 3.

Cumulative Effects

Cumulative impacts to the transportation infrastructure from past, existing, and other planned or foreseeable vegetation management activities within the cumulative effects analysis area would not increase as a result of the proposed projects. There would be a temporary increase in the amount of open roads during project activities; however, there would not be an increase in the number of miles of open road once project activities are completed because temporary roads would be closed and obliterated once vegetation management objectives have been achieved. Temporary roads utilized for timber sale activity would be closed to the public during the life of the project. There would be no effect on the cumulative number of road miles and road densities within the analysis area from any of the action alternatives.

Related projects within the cumulative effects area may involve road construction, reconstruction and increased traffic due to the existing and potential energy exploration/production within the Surface Creek and Buzzard Creek watershed. There may be a possibility of road reconstruction relating to gas energy which would utilize closed roads of past timber sales. With the possibility of the gas well work occurring in unison with various small timber sales, traffic levels may double when gas well related hauling and construction are underway in these areas. Where both occur simultaneously, both projects would be responsible for the maintenance of the shared road, including implementing necessary safety criteria.

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

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Christie LaDue, Forester

FEDERAL, STATE, AND LOCAL AGENCIES*:*

US Representative John Salazar

US Senator Michael Bennet

US Senator Mark Udall

Town of Hotchkiss

Town of Fruita

Town of Cedaredge

Town of Orchard City

Town of Collbran

City of Grand Junction

City of Delta

Town of Palisade

Delta County Commissioners

Mesa County Commissioners

Delta County Commissioners

Montrose County Commissioners

Colorado Division of Water Resources

US Fish and Wildlife Service

USDI Bureau of Reclamation

Colorado Division of Wildlife

Colorado State Forest Service

TRIBES:

Ute Mountain Ute Tribe

Southern Ute Tribe

Northern Ute Tribe

Unitah and Quray Tribal Business Committee

OTHERS:

Various Grazing Allotment Permittees (see project record)

Private Land Owners (see project record)

Special Use Permittees (see project record)

Outfitter Organizations (see project record)

Leroux Creek Water Users Association

Grand Mesa Water Users Association

High Country Citizens Alliance

Western Colorado Congress

Grand Mesa Nordic Council

Colorado Wild

Gateway Canyons Corp.

Grand Mesa Lodge

Mesa Lakes Resort

Thunder Mountain Lodge

Grand Mesa Christian Camp Association

GJ Camp Kiwanis

Canyonview Curch

Colorado Mountain Bike Association

North Fork Snowmobile Club

Snow Skippers

Various Water User Organizations (see project record)

Western Slope Environmental Resource Council

Colorado Environmental Coalition

Intermountain Forest Industry Association

Delta Timber

Doug Jones Sawmill

Western Excelsior Corporation

Laramie Energy II, LLC

Todd Enterprises

Club 20

Delta-Montrose Public Lands Partnership

Delta Snokruisers

Thunder Mountain Wheelers

Western Slope ATV Association

Bookcliff Rattlers